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Page 49, fourteenth line from top, for "tomentosa" read "tomentella."
" 96, thirteenth and fourteenth lines from bottom, for "stricta" read "arvensis."
" 99, fourth line from top, for "tomentulosa" read "leucophylla."
" 154, eighth line from bottom, for "limosa" read "aquatilis."
" 215, twelfth line from bottom, for "pulegioides" read "Pulegium."
" 335 and 336, for "Pinus contorta" read "P. Murrayana."
" 338, twenty-third line, for Negundo "Californica" read "N. Californicum."
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NOTES ON A COLLECTION OF MAMMALS FROM THE SIERRA NEVADA MOUNTAINS.

BY WILLIAM W. PRICE.

In the summer of 1892 the writer made a trip into the higher Sierra Nevada Mountains, during which he secured for the Leland Stanford Jr. University the small collection of mammals on which the following notes are based. The collecting was done chiefly in three different localities; namely, at Red Point and at Summit Station, in Placer County, and on Mount Tallac, in El Dorado County.

The topography of the country, hastily sketched, is as follows: Red Point is at an altitude of about 4500 feet, on the Forest Hill Divide—a tongue of land lying between the North and Middle Forks of the American River. Heavy forests of sugar and yellow pines, fir, spruce, and cedar clothe the ridges; the undergrowth is composed chiefly of several species of Ceanothus, manzanita, and scrub oak.

The open, brushy tracts on the top of the ridge are the favorite haunts of the long-eared chipmunk, *Tamias macrorhabdotes*. The California ground squirrel, *Spermophilus grammurus beecheyi*, which has here about reached its vertical limit, is common on rocky hillsides. Two other squirrels, the California gray squirrel, *Sciurus fossor*, and the California chickaree, *Sciurus hudsonius californicus*, are found everywhere in the timber though preferring deep hillside forests.

Summit Station, the highest point on the Central Pacific Railroad, is about 7000 feet above the sea. On the east the mountains descend abruptly toward Donner Lake, but westward the slope is much more gradual. A broad, grassy valley, the head waters of the Yuba River, takes its rise

at the summit. The chief timber is the tamarack pine, *Pinus contorta*, which still forms heavy forests along the sides of the valley though much of it has been cut away since the coming of the railroad. On the high ridges, a thousand feet above the valley, are found scattering groves of a beautiful fir, *Tsugo Williamsonii*. Along the stream which wanders through the valley grow thickets of a dwarf alpine willow and alders; often about these in the grass were runways of meadow mice or voles. It was in this valley that I first found the curious alpine spermophile, *Spermophilus beldingi*. The gilded chipmunk *Spermophilus chrysodeirus* was also abundant in the rock ledges.

Mt. Tallac, about which the greater part of the collection was made, is nearly 10,000 feet in altitude and lies a few miles south-west of Lake Tahoe. The western slope is not precipitous like the eastern side, and is well timbered in places, chiefly with tamarack pine, a few groves of Williamson's fir and *Pinus flexilis*, the latter a dwarf snow-crushed pine, bearing five leaves and small purple cones, and found only on the highest peaks and ridges. There are many boggy springs along the mountain slope, about which flourish alder and willow thickets. It was in these places that I found the only traces of the weasel, *Putorius arizonensis* (?). Several mammals, including the gray-headed pika, *Lagomys schisticeps*, the yellow-bellied marmot, *Arctomys flaviventer*, and two or three species of *Tamias*, were found commonly high up among the rocks.

From Mt. Tallac I made a hasty three days' trip into the Carson Valley, Nevada, obtaining there specimens of *Arvicola* and *Tamias*. A large hare, *Lepus texianus*, and the antelope squirrel, *Spermophilus leucurus*, were common on the sage plain east of the valley; along the eastern base of the Sierra Nevada I saw several specimens of a large bushy-tailed spermophile which was probably *Spermophilus grammurus*.

I failed to obtain specimens of many common species, either through lack of time or accident; these species with others commonly known to the trappers will be enumerated at the close of the list. I have taken advantage of the identification by Dr. J. A. Allen of some of this material submitted to him by the Museum, and I am also greatly indebted to Prof. C. H. Gilbert and

Mr. W. E. Bryant for aid of various kinds in the preparation of this paper. The numbers used throughout the paper are the serial numbers of the mammal collection in the University Museum.

1. *Tamias quadrimaculatus* Gray.

This species, of which six specimens were taken, was found only at two localities, Summit Station and on Mt. Tallac. They are all in worn pelage, having not yet attained their fall coat, but all show on the flanks, patches of rich ferruginous that cannot be mistaken. The series varies somewhat in intensity of color, although they were all collected within a period of three weeks. Two specimens, No. 51, a male, taken July 31, and No. 97, a female, taken August 12, on Mt. Tallac at about 8500 feet elevation show the highest coloration. In one specimen, No. 66, a male, nearly all the outer coat has been shed, leaving the soft black under pelage, through which the new hairs of the stripes are beginning to show.

Little is known of either the horizontal or vertical distribution of this species. It is considered by Dr. Allen a Sacramento Valley form, and is recorded from the following localities: Nevada City, Nevada County; Fort Crook, Shasta County; Baird, Shasta County; Mt. Shasta, Lassen County; and from Fort Klamath, Oregon. As is readily seen, none of these localities are in the Sacramento Valley. They are all in the lower portion of the pine belt which covers the western slope of the Sierras down to an altitude of about 1500 feet in the Mt. Shasta region and to about 2500 feet in Central California. The discovery by the writer that *Tamias quadrimaculatus* inhabits the upper slopes of Mt. Tallac was unexpected, and goes to show that from Nevada City northward this species probably inhabits the entire western slope of the Sierra down to the limit of evergreen forests. Its extension southward is still unknown.

Gray's type of *Tamias quadrimaculatus* came from Michigan Bluff, which stands at an elevation of 3500 feet, some fifteen miles in a direct line due south of Blue Cañon, and about half that distance from Red Point. The three localities present similar conditions, standing at approximately the same elevation, and all included in the great belt of yellow and sugar pine.

When it is recalled that at Red Point and Blue Cañon, *Tamias macrorhabdotes* only, seems to occur, it appears probable that this is the only species, or at least the most abundant one to be found at Michigan Bluff also. In connection with this we have the fact that neither in the original description of *T. quadrimaculatus*, nor in Thomas's later notes to Dr. Allen concerning the type specimen, is there anything characteristic. It is thus seen that Dr. Allen's first impression that Gray's species should be identified with *T. macrorhabdotes* has the probabilities greatly in its favor. Until the original type is more critically re-examined, or until Michigan Bluff is explored, it may be as well to follow Dr. Allen in identifying *T. quadrimaculatus* with the species here so designated.

2. *Tamias macrorhabdotes* Merr. Long-eared Chipmunk.

Eleven specimens taken in the neighborhood of Red Point are all distinctly referable to this species, and show but little variation. All were taken in late June or early July and are in breeding pelage. Several of the females were nursing and one or two contained small embryos.

The long-eared chipmunk is pretty well distributed on the Forest Hill Divide, and chipmunks supposed to be of this species were seen at altitudes varying from 3000 to 5500 feet. On top of the Divide a mile or two from Red Point is a fire-swept stretch of woods, with charred bushes and logs and trees both living and dead. The soil is a rich sandy loam supporting many species of flowering plants. In this locality the long-eared chipmunk is especially abundant. Sometimes a dozen could be seen at once playing on the logs and charred trees or scratching in the dust. My observations confirm those of Mr. C. A. Allen, who says that this animal is almost exclusively terrestrial, and that if it is surprised while on trees it will try in every way to reach the ground unseen and hide in holes or rubbish heaps. I have often seen it high up on trees, where it very skillfully reached the ground without being seen by descending the opposite side. It has the usual shrill note of alarm, somewhat louder than those of other species I have met.

3. *Tamias senex* Allen. Gray Chipmunk.

Three specimens of this chipmunk captured on Mt. Tallac

were the only ones secured. They were taken at a little over 7500 feet elevation, among bushes and granite boulders along the western slope of Mt. Tallac. I do not remember seeing any at Summit Station, the type locality of the species, but several large gray chipmunks were seen at the foot of Donner Pass, along the western end of Donner Lake. Their size was noticeably greater than that of the smaller chipmunks, *amœnus* and *frater*, which I had been collecting on the summit.

Of three specimens two are adult females collected August 4 and 12, apparently just beginning to moult. The other, taken August 12, is a young male, nearly full grown and somewhat richer in coloration.

4. *Tamias amœnus* Allen. Klamath Chipmunk.

Of the seven specimens of *Tamias* referable to this species, three were taken at Summit Station and four on Mt. Tallac. They are mostly in ragged pelage, and some seem to approach *Tamias frater*, though in all the specimens the pale buff base of the hairs on the upper surface of the tail is enough to distinguish them easily.

This is the smallest species of *Tamias* collected in the Sierra Nevada; two specimens, No. 58 ♂, and No. 62 ♀, were collected on bare rocks on Mt. Tallac, at 9500 feet elevation. It was found on trees, on the ground, and among rocks. Numerous small chipmunks were seen on a rocky, scantily-wooded hillside some miles west of Summit Station and at about 1000 feet lower altitude, but as no specimens were taken, they might have been either *amœnus* or *frater*.

5. *Tamias frater* Allen. Sierra Nevada Chipmunk.

Seven specimens of this form were taken, five at Summit Station and two on Mt. Tallac. These, like most of the other chipmunks collected in the Sierra Nevada, are in transitional pelage and consequently very difficult to determine. Some approach exceedingly close to *Tamias quadrimaculatus* in coloration. The habits of this species appeared similar to those of *T. amœnus*.

6. *Tamias minimus pictus* Allen. Desert Chipmunk.

This species was found only in the Carson Valley, Nevada. It was common in the sage brush, sometimes a long distance away

from trees, but it was particularly abundant in brush heaps, old lumber piles, and was common on fences. The two specimens taken on August 9 were caught in a cavity between a fence-board and post. They were male and female, adults, and in excellent breeding pelage.

7. *Spermophilus chrysodeirus* Merr. Gilded Chipmunk.

Animals of this species seemed abundant above 6000 feet on the west slope of the Sierra and at a lower altitude on the eastern slope. They were first seen on a rocky hillside near Cisco, a station on the Central Pacific Railroad below Summit Station. Afterwards they were found commonly at Summit Station, along the Truckee River, on Mt. Tallac, and on a spur of the Sierra, skirting the east shore of Lake Tahoe and sloping down to the Carson Valley. They prefer open hillsides thinly grown with pines and most frequently make their burrows beneath rock piles and ledges. They seem to be entirely terrestrial. I did not see one on trees and bushes. They feed on various grasses and flower-seeds and probably also on the seeds of the fir and pine.

Twenty specimens show a large amount of seasonal and individual variation. No one feature appears to be constant. The dorsal stripes vary in length, breadth, and intensity of color. In six specimens only can the white stripes be traced as far as the base of the tail; they also extend forward and blend into the golden yellow of the shoulders and post-auricular patches. In one specimen, No. 72, a female, the post-auricular patches are nearly white, and others show a complete gradation to the rich golden brown of the most highly colored specimens. The shoulders vary in color from a tawny iron-gray to the deepest orange. The color of the central area of the under side of the tail varies from pale orange to deep chestnut, and the tips of the fringing hairs from silvery gray to ochreous. A young specimen about two-thirds grown, taken August 6 on Mt. Tallac, is not so bright as the adults. In it a leaden gray suffuses the lower parts and extends well up on the sides, while the crown-patch, shoulders, and post-auricular regions are only softly tinged with ochreous.

8. *Spermophilus beldingi* Merr. Belding's Spermophile.

This short-tailed spermophile is one of the most conspicuous

mammals of the high Sierras, sharing that distinction with the marmot, *Arctomys flaviventer*, and the gilded chipmunk already mentioned. It was especially abundant in colonies of half a hundred or more in the grassy valley at Summit Station. Other colonies were seen about Mt. Tallac and Pyramid Peak, always on grassy flats and gentle hillslopes.

They are short, thick-set little rodents and have a peculiar loping gait. They have the habit of sitting up on their haunches when alarmed, shared by other members of the genus. This habit has given them the local names of "picket-pins," "prairie dogs," and "woodchucks," though the latter name is more generally applied to the marmot. They often wander some distance away from their burrows. I have seen a grassy meadow covered with them feeding on grass seeds; when alarmed the whole company would rush loping to their homes. Several shot at Summit Valley had their cheek-pouches distended with the green seeds.

A series of fifteen skins shows little color variation, and that confined to the dorsal stripe and the fulvous wash of the under-parts. Some young specimens, a week or two old, taken July 21 at Summit Station have nearly the exact color pattern of the adults. Another, perhaps six weeks old, taken August 12 on Mt. Tallac, is paler in color, the crown patch and dorsal stripe are faint, and the under parts are bluish gray, the color extending up on the sides.

9. *Spermophilus grammurus beecheyi* (Rich.) California Ground Squirrel.

A single specimen was taken near Red Point. Ground squirrels are common in the Sierra Nevada up to nearly 6000 feet. Higher than that they give place to the marmot, and the smaller spermophiles, *Spermophilus beldingi*. They frequent rocky hillsides, and though common they are shy and not nearly so conspicuous as in the valleys of California.

10. *Sciurus hudsonius californicus* Allen. California Chickaree.

Only three specimens were taken, two at Red Point on July 6 and one at Summit Station July 30. Several others were seen; one along a road beside Lake Tahoe, appeared to be in the black stage. My companion remarked: "That's the first *black* squir-

rel I've seen in California." At another time a pair came close into camp high up on Mt. Tallac and fearlessly picked up some bits of bread. This species ranges higher in the mountains than *Sciurus fossor*, appearing to inhabit the Sierra from about 2500 feet up to 9500, or as far as timber extends. It delights in heavily wooded slopes filled with dense undergrowth. Its loud chattering call notes were commonly heard about Red Point, though always in almost impenetrable places.

The three specimens present no marked variation. The black lateral stripe separating the gray of the dorsal region from the white of the under parts is conspicuous in each, and the bright orange on the upper surface of the feet is also present. They are each in transition pelage, patches of new hair lying side by side with the old.

11. *Sciuropterus volucella hudsonica* (Gmelin). Northern Flying Squirrel.

A single caged specimen was given to me at Red Point. This was the only one seen though I was told they had been very numerous there the winter previous. They frequented a feed stable and barn, and became very troublesome, gnawing into sacks and destroying the grain. Many were caught in box traps but they continued to increase until some cats were placed in the barn, which routed them. Some time after, when sweeping out the place, two dozen squirrels' tails were picked up. The winter was a severe one, and plenty of food at the barn had called them from a long distance. I was told by woodcutters that sometimes in felling a tree, especially if the top was broken and bushy, some of these little animals would soar down from the top just before it fell and alight on another tree, running up quickly to the higher branches. During forest fires, which often sweep over the mountains, the flying squirrel with other animals as rare are sometimes seen. In traveling through the mountains I have asked many people about this interesting little rodent, but only a very few had ever seen it and many had never heard of it at all. Its nocturnal habits, of course, make it seem rare, but judging from the numbers found in the barn at Red Point it surely must be much more common than it is supposed to be.

12. *Arvicola* sp.? **Meadow Mouse.**

Three *Arvicolas*, which I am at present unable to identify, owing to the unsettled condition of the genus, were taken in a hay field in the Carson Valley, Nevada, on August 9th. They are extremely abundant in fields in some parts of the Valley, and at times are very injurious to crops.

An *Arvicola*, probably a different species, was noticed in boggy meadows about Summit Station, on Mt. Tallac, and near Pyramid Peak. These animals had well-beaten runways and numerous holes, showing that a colony of several hundred lived together. Once in a bog at the base of Pyramid Peak one of these little animals stopped for a moment at the mouth of its burrow, thus giving me time to notice its dark coloration and small size.

13. *Sitomys americanus gambelii?* (Baird). Gambels' White-footed Mouse.

White-footed mice were observed at Red Point, Summit Station, and on Mt. Tallac. A single specimen, No. 3, a male, taken at Red Point on June 27, is darker in coloration than any of the adults from Mt. Tallac. A Sitomys, probably referable to this species, was captured at Summit Station, but the specimen was unfortunately lost. The series of eight specimens from Mt. Tallac show great individual variation. They range from bluish in the young to deep brown with a vinaceous tinge in the adults. One specimen, No. 47 ♀, is pale yellowish, resembling in color *Sitomys americanus sonoriensis*.

This species was noticed generally in dry pine woods and specimens were caught in traps baited with bits of bread and dried fruit; a single specimen was secured while turning over a log in search of beetles.

There is some doubt whether this species may not be the *Sitomys boylii* of Baird, which was described from a single specimen taken by Dr. C. C. Boyle in El Dorado County, on the Middle Fork of the American River in 1852. The description of *Sitomys boylii* is imperfect and the type specimen is faded and mutilated, so that it is impossible to find exactly what the characters of that species are, as noted by Dr. Allen in his recent review of some Californian Sitomys. My specimens, with one exception, were all taken at a high altitude. It is not known

whether the animal taken by Dr. Boyle, was high up on the mountains or down in the foothills close to the Sacramento plain; if the former, my specimens were from the neighborhood of the type locality.

The specimens here referred to were first identified by Dr. Allen as *Sitomys boylii*, but were later referred to *S. a. gambelii* and his identification is here followed.

14. *Neotoma cinerea* (Ord.) Bushy-tailed Wood Rat.

Found only at the Glen Alpine Sulphur Springs, on Mt. Tallac, where six specimens were secured. The species was said to be formerly abundant about the feed-stable and buildings of the resort, but had been nearly exterminated by cats about the place; when I arrived there appeared to be only one pair, with its young. On August 3 I trapped an adult male, and the same day one of the workmen brought me three young only a few days old. Later, August 12, I secured the female and another young one.

This species seems to have habits in common with *Neotoma fuscipes* of the interior valleys of California, especially the habit of carrying food away from cabins. An old miner told me that during the preceding winter these rats had taken possession of his cabin when he was away, and in a few nights had completely removed a sack of potatoes. Later he had found the greater part of the stolen goods in a hollow stump near his dwelling. I have also been told that these animals frequently bring back articles to replace the things stolen, and have from this habit been called "trading rats," but I have no proof of this assertion.

The six specimens vary in color. The adult male is dark gray above with faint shadings of brownish yellow along the sides, extending to the rump and for a short distance along the upper surface of the tail. The latter is dark gray for the most part, but is tipped with grayish white. The female of this species is a brownish yellow, richer along sides and on rump and shoulders. Below from nose to tip of the tail it is similar to the coloration of the male. The three young, collected August 3, are dark gray above, the color intensifying posteriorly until the lower back and rump are almost black. The brownish wash has begun to appear along the sides and about the shoulders. Below, along the median line, the pelage is pure white, but

blends into the gray of the sides. The young, collected August 12, is not so dark as the specimens taken on August 3, the gray having become clearer. There are also more pronounced traces of yellowish brown. Unfortunately I took no measurements and am unable to give comparative size.

15. *Thomomys monticola** Allen. Sierra Nevada Gopher.

Four specimens of this gopher, which proved to be new, were taken on Mount Tallac, at altitudes varying from 6500 feet, close to Lake Tahoe, up to 9500 feet near the summit of the mountain. The work of gophers was observed all over the high Sierras, especially in damp patches of vegetable mould about Summit Station, along the Truckee River, and on the grassy glades and slopes of Mount Tallac. On this mountain they were often noticed throwing up earth in the daytime and were especially abundant well toward the summit, often close to snow fields.

This gopher is characterized by a long and narrow skull, an exceptionally broad interparietal bone and very long and soft pelage. Above it is pale reddish brown, tinged with gray, and below, ashy white.

16. *Lagomys schisticeps* Merr. Gray-headed Pika.

Only two specimens of this curious little alpine rodent were secured; these were taken on July 28 among broken rocks on the very summit of Mt. Tallac. No more were seen in that locality, but on Pyramid Peak and on a rocky ridge near it they were abundant on August 5. It was late in the afternoon and the snow banks and tiny streams of water were freezing in shady places, but the little animals did not seem at all to mind the cold. They ran about over the rocks and snow beds and some had ventured a distance away from their homes and were feeding on a bright red alpine flower. Their sharp, squeaking cries were continually heard even after the sun had set. Several of their nests had little heaps of flower-stems and grass before the openings, and it may have been that even at this early date they were laying in their winter stores.

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* *Descriptions of Four New Species of Thomomys, with Remarks on other Species of the Genus.* By J. A. Allen, Bull. Am. Mus. Nat. Hist., v, p.48, April 28, 1893.

The only adult specimen, No. 42 ♂, is in worn pelage. The ends of the hairs are worn off along the back, leaving it dark brown in places. The young, No. 44 ♂, has long silky pelage of a grayish tawny color with interspersed black hairs.

17. *Scapanus townsendii* (Bach). Townsend's Mole.

A single specimen was taken at Red Point in a cellar. The marks of moles were seen all over the high Sierras especially about snow fields on Mt. Tallac, but no specimens were taken.

18. *Putorius arizonensis* Mearns. Arizona Weasel (?)

A Putorius, provisionally referred to this species, was taken high up on Mt. Tallac July 29. It was seen in a boggy piece of meadowland searching among dwarf willows. A few days later another specimen was seen in a similar place, but it was not secured.

The following is a list of the mammals seen or known to inhabit the Sierra Nevada, but no specimens were taken.

19. *Cariacus Columbianus* (Rich.) Black-tailed Deer.

This deer is common all through the mountains, in summer, up to 9500 feet. In the fall it migrates from the higher altitudes down to about 4500 feet and lower, but usually it is not found above that altitude in winter.

20. *Antilocapra americana* Ord. Antelope.

The antelope has been seen along the eastern base of the Sierra Nevada in the Carson Valley, but its range does not reach up into the mountains.

21. *Arctomys flaviventer* Aud. and Bach. Yellow-bellied Marmot.

Marmots were first seen near the Central Pacific Railroad at about 6000 feet. They were common about Summit Station and on the mountain sides along Donner Lake, frequenting granite ledges and rock piles. But on Mt. Tallac they seemed the most abundant, frequenting the slopes of the mountain from near Lake Tahoe to the very summit. About the summer resort at the Glen Alpine Springs, near the base of the mountain, they were abundant, and when everything was quiet about the place they often approached close to the kitchen in search of bits of vegetables

and refuse. Higher up on the mountain they were exceedingly abundant. On bright days a dozen or more could often be seen at once playing about logs and rock piles. They feed largely on grass and seeds; and down to certain meadows they had well-beaten trails leading from their homes in rock-ledges. I frequently found their burrows under stumps and the roots of trees. Judging from the number of entrances and the amount of excrement, several individuals occupied each den, and from appearances the dens had been inhabited many years.

The flesh of the marmot furnishes food to a large number of Nevada Indians who come up into the mountains for the summer months. They usually hunt with shotguns loaded with heavy shot, and catch the animals away from their dens by lying quietly close to them. During August the reports of guns on the higher parts of the mountain were continually heard, and an Indian has been known to secure two dozen in the course of the day. The flesh is said to be excellent eating and forms a delicacy at some of the resorts about Lake Tahoe.

22. *Spermophilus leucurus* Merr. Antelope Squirrel.

This animal was seen only in the sandy, sage-covered plains east of the Carson Valley, Nevada.

23. *Spermophilus grammurus* Say. Ground Squirrel.

Three or four individuals supposed to be of this species were seen along the base of the mountains west of the Carson Valley. They had burrows in the rocky hillside and allowed me to approach on horseback quite close to them.

24. *Sciurus fossor* Peale. California Gray Squirrel.

This species is common in the sugar and yellow pine belt along the west slope of the Sierras. It was seen on the Forest Hill Divide from about 2500 feet up to 5500. North of the North Fork of the American River, in the neighborhood of Blue Cañon, a few were noticed, but none were above the altitude of the sugar pine belt. In the neighborhood of Red Point they were generally distributed through the timber; their barking was frequently heard. Their chief food is the seeds of the sugar pine, *Pinus Lambertiana*, the largest and most beautiful pine in the Sierra Nevada. Under almost every tree are chips

which the squirrel has gnawed from the cones. He does not wait until the cone is ripe, but often gnaws the scales from the young cone while it is yet hanging on the tree. I have sometimes seen this squirrel hanging head downwards a hundred and fifty feet from the ground feeding on a cone. The gray squirrel does not hibernate, but usually descends lower in the mountains during the heavy snows. In the winter of 1891-92 I saw them frequently in the neighborhood of Blue Cañon running about over snow four feet deep. When chased they would not take to trees at once, but continued to run over the snow until closely cornered. Dogs are often used in winter to hunt them.

25. *Aplodontia major* Merr. California Sewellel.

This striking rodent was observed in the neighborhood of Red Point, and about a grove of big trees, *Sequoia gigantea*, about twenty miles southeast of Red Point, in Southern Placer County. Near Red Point two small colonies were seen in boggy land about springs. Both places were densely overgrown with brush and weeds. No specimens were taken here, but their presence was noted by freshly gnawed stems about their burrows. At the big tree grove a much larger colony was found. Their burrows were in the bottom of a ravine among dense beds of moss, thickly shaded with tangled bushes. A delicate mountain cranberry, *Vaccinium occidentale*, grew abundantly about the place, and little heaps of the stems, some with the berries still attached, lay scattered about the entrances to the dens. Large quantities of stems of *Ceanothus* and *Rhododendron* were found gnawed into lengths of about six inches. Some were over half an inch in diameter and freshly gnawed, others seemed several years old. I heard its shrill cry several times when near this colony, but saw only one.

The name "mountain beaver," by which this animal is known to the miners, has been given to it on account of its habit of gnawing sticks like the beaver. The Indian name is "sewellel." This particular species is *A. rufus*, and is found throughout Washington and Oregon and south in Western California to Humboldt Bay. There is a specimen in the University Museum taken by Mr. Chas. Fiebig at Eureka.

26. *Fiber zibethicus* (Linne). Muskrat.

Muskrats were abundant in the sloughs and marshes in the Carson Valley, Nevada.

27. *Neotoma fuscipes* Cooper. Dusky-footed Wood-Rat.

A wood-rat supposed to be of this species comes up to at least 3000 feet on the west slope of the Sierra Nevada. Their large nests were seen in the vicinity of Forest Hill.

28. *Thomomys bottæ* Less.

A gopher is found from the Sacramento plains up to at least 4000 feet.

29. *Zapus hudsonicus* (Zimm.) Jumping Mouse.

This mouse is included in the list of mammals found in the Sierra Nevada, on the authority of a trapper, a Mr. Dent, who informed me that he had often taken it with poison placed out for foxes and wild cats.

30. *Erethizon epixanthus* Brandt. Western Porcupine.

The presence of this species was noticed in numerous places in the high Sierra. Many pine trees about Mt. Tallac and Pyramid Peak had patches of gnawed bark, and the animal's quills were frequently found. A single dead specimen was found in a meadow near Pyramid Peak on August 10.

31. *Lepus sylvaticus auduboni* (Baird.) Cottontail Rabbit.

A few specimens of this rabbit were seen on the Forest Hill Divide, at about 3000 feet. They are abundant from the Sacramento plains up to that altitude or a little less.

32. *Lepus americanus washingtoni* Baird. Western Varying Hare.

Some of this species were seen about Dutch Flat, in Placer County, in the winter of 1891-92. In the high Sierra I am told that they are nearly white in midwinter.

33. *Lepus texianus* Waterhouse. Texan Jack Rabbit.

A few specimens were seen along the base of the mountains west of the Carson Valley.

34. *Lepus californicus* Gray. California Jackass Rabbit.

This species is very abundant in the Sacramento Valley and in the mountains to at least 2500 feet. Some were seen on the lower end of the Forest Hill Divide.

35. *Sorex* sp.? **Shrew.**

No doubt several species of shrews inhabit the Sierra Nevada Mountains. Tracks of a large species was seen about a marshy lake on Mount Tallac on August 3.

36. *Ursus americanus* Pallas. **Black Bear.**

Bears are common in places in the mountains from the Sacramento plains to the timber line. About the Sequoia grove, in southern Placer County, several individuals must have had their dens, for there were numerous fresh tracks and torn bark on the tree trunks. This bear has the local names of "brown bear" and "cinnamon bear" among hunters and miners.

37. *Ursus horribilis* Ord. Grizzly Bear.

At one time this was the most conspicuous bear in the mountains, and many wild tales are told of it by the early miners. Now, however, very few remain, and these have retreated into the wildest and most inaccessible places. From the reports of trappers there is reason to believe a few still exist on the western slopes of Pyramid Peak.

38. *Procyon lotor* (Linne). **Raccoon.**

This animal is abundant from the Sacramento up to at least 4500 feet. Its tracks were seen about a spring near Red Point, in June.

39. *Bassariscus astuta* (Lich.) Ring-tailed Cat.

This animal is common in the mountains up to 4000 feet or higher. The miners frequently tame them for pets.

40. *Lutra canadensis* (Turton). American Otter.

A single specimen was captured by Mr. Dent during the winter of 1891-92 on the South Fork of the American River, in El Dorado County. This animal is exceedingly rare; during ten years' trapping he had seen only five specimens.

41. *Mephitis mephitica* (Shaw). Common Skunk.

Skunks are common in the lower altitudes of the Sierra Nevada Mountains.

42. *Spilogale phenax* Merr. **Little Stupid Skunk.**

A single specimen was killed by a rancher on the lower Forest Hill Divide.

43. *Taxidea americana* (Bod't). Badger.

Badgers are common along the eastern base of the Sierra Nevada bordering the Carson Valley, and also in the lower western slope to at least 2000 feet.

44. *Gulo luscus* (Linne). Wolverine.

Mr. Dent informed me that he was sometimes troubled in his trapping by the depredations of wolverines. They made the rounds of his traps, eating such animals as the martin and fisher. He said they were found mostly above 5000 feet in the densest fir and pine timber.

45. *Putorius vison* (Schr.) American Mink.

A single specimen was seen in a pond in the Carson Valley, Nevada. A poultry yard near by was frequently visited by these animals and the owner had succeeded in trapping several.

46. *Mustela pennanti* Erxleben. Pennant's Martin; Fisher.

One individual was seen near the resort on Mt. Tallac shortly before my arrival. Mr. Dent informed me they were the most valuable animals to trappers, and that he frequently secured several dozen during the winter. They prefer the high wooded ridges of the west slope of the Sierras above 4000 feet.

47. *Mustela americanus* (Turton). Martin.

I learned from Mr. Dent that this species is common in the higher forests and is associated with the fisher.

48. *Urocyon virginianus virginianus* (Schr.) Gray Fox.

Foxes were noticed from the Sacramento plains up to about 4000 feet, and they no doubt go much higher.

49. *Vulpes fulvus argentatus* (Shaw). Silver Fox.

This fox is found only in the higher forests. Mr. Dent has frequently trapped it, and in the black stage of the pelage is one of the most valuable fur-bearing mammals, the skins often bringing thirty-five dollars apiece.

50. *Canis lupus griseo albus* (Linne). Gray Wolf.

This species has been seen several times by Mr. Dent in the dense forests above 6000 feet.

51. *Canis latrans* Say. Coyote.

The coyote is common on both sides of the Sierra Nevada Mountains, and in summer frequently follows flocks of sheep to

the highest meadows. This animal and the "California Lion" are the sheep-herders' greatest enemies.

52. *Felis concolor* Linne. California Lion; Panther.

This beast is common in places on both sides of the mountains and extending to high altitudes. It is very destructive to sheep and colts. Some horse ranches have had to be abandoned on account of its ravages.

53. *Lynx rufus* (Güld.) Wild Cat.

Apparently this species has about the same range as the mountain lion. None were seen about Red Point, but it is said to occur in the neighborhood and is destructive to poultry yards.

DISTRIBUTION OF SOUTHERN CALIFORNIA TREES.

BY S. B. PARISH.

The distinguishing feature of the natural vegetation of the five southern counties of California is the prevalence of shrubs. Over probably three-fourths of the surface this was the principal growth. Scattered in open order over desert and plain and valley affording clear space or sheltered covert for a multitude of humbler plants, or massed on hillsides in close and often impenetrable chaparral, it was seldom that shrubs gave place to meadows or forests. The aridity of the climate is doubtless the cause of this peculiar condition, woody plants being better able to endure a deficiency of moisture than those of a more succulent nature, while from the same deficiency the former are unable to develop into arboreal forms. From the same cause many species are here stunted shrubs or barely arborescent, which in cooler and moister climates attain to the dimensions of considerable trees.

Hence, too, at lower altitudes the arboreal vegetation is mostly riparian. The streams are scantily fringed with cottonwood, sycamore, alder, and a few species of willow, which do not extend beyond the irrigating influence of the water. In other cases the close proximity of a moist subsoil enables a grove of trees to be sustained, of which the cottonwood groves which formerly existed in the San Bernardino and the San Jacinto

Valleys, and the palm and mesquite groves of the deserts are examples. The belt of Blue Oak (*Quercus Engelmanni*) which stretches across the hill country of San Diego County, and the park like growth of *Quercus agrifolia* which covers the slopes in the neighborhood of Pasadena, are perhaps to be attributed to the moisture supplied by the ocean fogs which roll in and condense upon the seaward exposures which they occupy. The exception to the rule is found in that peculiar forest of yucca and juniper which fringes the northern base of the San Bernardino Range from its eastern extremity to the upper end of Antelope Valley, and whose existence or limitation seems to have no perceptible connection with hydrographic conditions. Its constituent trees are the only ones that have solved the problem of arboreal growth without a continuous supply of moisture.

At higher altitudes the cooler air and greater humidity afford more favorable conditions for tree growth; the chaparral itself becomes denser and larger, and at an altitude of between 4000 and 5000 feet a coniferous forest begins which reaches nearly to the summit of the highest mountains.* This belt, which occupies the higher parts of the San Bernardino Range and its continuation, the San Jacinto and Cuyamaca Mountains, is by no means a continuous one. It rather consists of a series of forested tracts limited in area in accordance with their altitude and slope-exposure; some mere patches measured by acres, while the largest extends from near the Cajon Pass to Grayback Mountain. West of this main forest there are small bodies of coniferous trees in the Cucomonga and San Antonio Mountains, in the so-called Sierra Madre, and in the Liebre Mountains, and to the south larger and more valuable forests occupy the San Jacinto and Cuyamaca Mountains. No accurate measurements of these forest areas have ever been made, and, indeed, could not be made without great expense and difficulty, so rugged and

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*There are but two bald-topped mountains in the whole region; San Antonio, 9630 feet high, and Grayback, 11,725 feet high. The latter is pine-clad to within 200 feet of the summit, and covered with the standing trunks of dead pines to the very top, so that there cannot be said to be any point above tree line.

broken are the mountains in many parts, and so invaded and intersected are the wooded tracts by chaparral. Compared with the great forests at the north these are not only insignificant in extent, but are equally unable to sustain the comparison in the size of the trees, or the density of their growth. Scattered in loose array over the hillsides, it is only on the moister soil of the flats, or in the shelter of cañons that the trees cast a dense shade, or attain to lofty proportions; yet they do not lack the extent and magnitude to excite those feelings of admiration and exaltation which forests ever raise in the mind, while their park-like disposition and the variety of species free them from gloom and monotony.

THE SAN BERNARDINO FOREST.

The outline of the area occupied by the largest, or the San Bernardino forest is that of a wedge, the point near the Cajon Pass, broadening eastward to Grayback Mountain; the length being about forty miles, and the greatest breadth twenty miles, the district included being in part forest, and in part chaparral or barren rock. On the south from a valley base of about 1200 feet above sea level the mountains rise with great abruptness to a crest of from 4000 to 8000 feet altitude, which runs in a generally east and west direction. The northern slope of this ridge, less abrupt than the southern, constitutes the water shed of the Mojave River, and on it is located the largest and best, as well as the most accessible body of timber. This is nearly twenty miles in length, and from one to three miles in breadth. South and east of this axis, and separated from it by the gorge of the Santa Ana River, which receives their drainage, rise the twin peaks of San Bernardino and Grayback. This region is of an exceedingly rugged character, and the forests which it nourishes are broken and difficult of access.

Commencing now at the southern foot of the range, a few small spruce (*Pseudotsuga macrocarpa*) are found on sheltered western or northern exposures, along the cañons, at about 2500 feet altitude;* these increase in size and in abundance until at between 3000 and 4000 feet altitude both sides of the

* On East Twin Creek, below the Arrowhead Hot Springs, a few grow as low as 1700 feet altitude.

cañons are usually clothed with them. At about 3000 feet a thin strip of dwarf pine (*Pinus tuberculata*) stretches for some miles along the face of the range, bounded above and below by the dense chaparral of Ceanothus and manzanita, which at this altitude has replaced the Adenostoma of the lower slopes, and is otherwise unbroken for another thousand feet. At 4000 feet the spruce is displaced by the other coniferous trees which constitute the main forest. Below 5000 feet this is mostly confined to the northern slope of the range, but above that overflows to the southern side, and, indeed, below it on sheltered slope-exposures. It is essentially a yellow pine (*P. ponderosa*) belt, that being the prevailing species nearly to the tree limit; with it are commingled, without any apparent vertical disposition, many firs (*Abies concolor*) and Post Cedars, smaller numbers of Black and Big-cone Pines (*P. Jeffreyi* and *P. Coulteri*), and still fewer Sugar Pines, together with an abundance of Kellogg's Oak, especially at the lower levels. This forest continues without appreciable difference to about 11,000 feet on the sides of Grayback Mountain, where it begins to be intermixed with *Pinus contorta*, which in small isolated groups occurs in Bear Valley, as low as 6000 feet. This in turn gives way at about 11,500 feet to *Pinus albicaulis*, which alone, forming the topmost belt, reaches nearly to the summit, 11,725 feet above sea level.* On the northern side of the range, which, it must be remembered, is the one facing the desert and affected by its aridity, the spruce re-appears at about 7000 feet altitude, but very sparingly, and in small groups in sheltered and moist situations. At 6000 feet *Juniperus occidentalis* is mingled with the pines, and in one place, mixed with *Cercocarpus ledifolius*, forms a belt between 6000 and 7000 feet altitude. Beneath this, and separated from it by an interval of chaparral, is a similar belt of Piñon Pines (*P. monophylla*) between 4000 and 5000 feet, and connecting in places with the upper edge of the Yucca belt. The Juniper and the Piñon belts are about twelve miles long, their failure to extend the whole length of the range being due to other causes than elevation.

* For most of my information concerning the Grayback forest I am indebted to Mr. W. G. Wright, who has repeatedly explored that mountain.

We have then in these mountains a great Yellow Pine belt of mixed coniferous trees;* at its upper edge a belt of *Pinus contorta* is indicated, capped by a well-defined belt of *Pinus albicaulis;* on the seaward side it is based on a zone of Pseudotsuga, and on the desert side by a belt of Juniper superimposed on one of Piñon. The smaller forests to the west and south, so far as known, include only the spruce and yellow pine belts.

ECONOMIC ASPECTS.

In the San Jacinto cottonwoods a small mill was for a time employed in turning out material for orange boxes, but with this exception the trees of the lower altitudes have been utilized only as a source of fuel supply, and a most important one for a region so distant from good coal measures.

The San Bernardino forest was at once drawn upon for lumber by the first American settlers in the subjacent valleys, and has been continuously worked up to the present day. Operations have been confined to the watershed of the Mojave, the only part of the forest sufficiently accessible to be worked with profit under present market conditions. Of the original forest of this watershed less than one-third now remains. In it are now located eight steam saw mills, capable of a total output of ten million feet B. M. in a summer run of six months. From various causes, dullness of business, exhaustion of the timber supply, and the competition of northern lumber, only two or three of these mills have been operated during the last two years, and all but three of them would entirely use up their accessible timber in one or two seasons' run. The product is drawn by horse teams to San Bernardino, where it has sold within late years at from twenty to sixteen dollars per thousand B. M., nine to seven dollars of the price being chargeable to freight. Most of the lumber is, of course, yellow pine. Mill men claim that of this there are two kinds; one, recognized by the broad plates of the bark, has a thin sap-wood, and the wood is soft, straight-grained and durable, and yields a good

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* As already stated, the different species composing this belt are not segregated in separate zones, but closer observation will probably show that *Pinus Jeffreyi* and *Libocedrus decurrens* have an upper limit somewhere between 7000 and 8000 feet.

percentage of clear lumber; the other, marked by a closer-checked bark, has more sap-wood, is cross-grained, readily decays, and is fit only for rough lumber. The difference of quality is said to be one of variety in the trees, and not to be due to age or place of growth. I have not been able to detect any botanical differences, except in the character of the bark, as above indicated. Black and Big-cone Pine, when sawn, is put in with the lower grade of yellow pine. The lumber from the sugar pine is most esteemed of all, most of it being clear. Post Cedar is sawn into dimension stuff, and is highly valued for its durability. It is rendered unfit for finer uses by the ravages of a dry-rot (*Dædalia vorax* Harkness) by which it is infested. The fir furnishes a light and strong lumber, but one difficult to season without warping; it is used to a small extent for scantling and bridge-flooring. None of the other trees are sawn. A few posts are made, but the destructive industry of the shingle and shake maker is a thing of the past, the market being supplied with redwood. In the San Jacinto forest there are two saw mills, their product, the amount of which I am not able to state, finding a market in the San Jacinto Valley.

The real economic value of these forests is as conservators and regulators of the water supply, a matter of most vital importance in a region dependent upon irrigation for its fertility. Fuel and lumber may be brought from afar, but water must be obtained near at hand. Fortunately public attention has been awakened to the importance of forests from this point of view, and in pursuance of the wise forestry policy of the Harrison administration, three forest reserves were set apart in Southern California, the San Bernardino Reserve of 737,280 acres, the San Gabriel Reserve, 555,520 acres, and the Trabuco Cañon Reserve, in Orange County, containing 49,920 acres. A proper supervision of these reservations will not only preserve them, but will also greatly restrict the destruction by fire and by the ravages of sheep in those portions of the forest that have passed into private ownership. Where the original forest has been removed an abundant growth of seedlings springs up, including all the species of the former growth in about their original proportions; so that if the destruction of them is prevented nature herself will in time reforest the denuded mountains.

PHYTOGRAPHIC RELATIONS.

The region here under consideration presents three distinct floras; that of the mountains, that of the desert, and that of the district between the main range and the sea coast, which may be called the intramontane. Adopting Dr. Merriam's phytographic areas, the mountain flora belongs to the Nevadan subzone, the desert to the Sonoran proper, and the intramontane to the Californian, or in a more general view the whole territory may be regarded as a part of the great Sonoran life area, into which projects, along the axis of mountains, a narrow arm of the Boreal. These relations become evident from a tabulation of the trees, and would be further enforced by an examination of the distribution of the shrubs and herbs.

MOUNTAIN AREA.

Acer glabrum
Prunus emarginata mollis
Cornus Nuttallii
Salix flavescens
Quercus Kelloggii
Castanopsis chrysophylla
Pinus Lambertiana
Pinus albicaulis
Pinus ponderosa
Pinus Jeffreyi
Pinus Coulteri
Pinus Murrayana
Abies concolor
Libocedrus decurrens

This zone is connected with the intramontane flora by a belt of *Pseudotsuga macrocarpa*, and with the desert flora by a belt of *Cercocarpus ledifolius* and *Juniperus occidentalis*. *Negundo Californica* and *Pinus tuberculata* also occur on the edge of this zone.

INTRAMONTANE AREA.

Rhamnus Californica
R. Californica tomentella
Acer macrophyllum
Negundo Californicum
Prunus ilicifolia
Prunus demissa
Cercocarpus parvifolius
Heteromeles arbutifolia
Sambucus glauca
Umbellularia Californica
Juglans rupestris
Quercus chrysolepis
Quercus agrifolia
Quercus lobata
Alnus rhombifolia
Populus Fremonti Wislizeni
Salix laevigata
Salix lasiolepis
Salix lasiandra lancifolia
Platanus racemosa

Lyonothamnus floribundus, *Quercus Engelmanni*, and *Pinus Torreyana* may be regarded as endemic. The bare projection into this area of the Coast flora is indicated by isolated groups of *Myrica Californica* and *Arbutus Menziesii*. *Æsculus Californica*, *Quercus Douglasii*, *Q. Wislizeni frutescens*, and *Pinus Sabiniana*, belonging to this flora barely enter our territory from the San Joaquin region, and hence are forced into a narrow belt between the desert and the mountains, over which they have been unable to pass into a region better suited to them.

DESERT AREA.

*Fremontia Californica**
Dalea spinosa
Olneya Tesota
*Prosopis juliflora**
Prosopis pubescens
*Acacia Greggii**
*Chilopsis saligna**
*Yucca baccata**
Yucca brevifolia
Pinus monophylla
*Juniperus Californica**

The close connection between this and the intramontane flora is shown by the fact that six of the above eleven species, designated by an *, pass to a greater or less extent into the intramontane district, while *Populus Fremonti Wislizeni*, of the former, passes into this desert. *Pinus Parryana*, which barely enters this area, and perhaps *Washingtonia filifera*, are prolongations of the Lower Californian subarea.

In the following table is shown the distribution in the different areas of the trees, separated according to their sizes: shrubs, and trees that barely enter the district being omitted. It will be seen that development is in accordance with the relative moisture of the different areas. The paucity of arboreal growth in the desert region is especially remarkable, when it is remembered that it is geographically the most extensive of the three.

	Mountain.	Intramontane.	Desert.	Total
Arborescent; up to 20 feet.....	4	5	3	12
Small trees; up to 50 feet.....	3	9	4	16
Medium trees; under 100 feet.....	4	6	1	11
Large trees; over 100 feet.....	6	0	0	6
Total.....	17	20	8	45

The following list includes all species which have been reported as trees, or which are so elsewhere, although here reduced to shrubs. The dimensions given are those of full-grown, but not exceptionally large specimens. The dimensions as well as the altitudes are estimated; it is regretted that actual measurements cannot be given. The ranges are assigned from personal observation and reliable information; further knowledge is more likely to extend than to restrict them.

LIST OF TREES.

Fremontia Californica Torr. *Fremontodendron Californicum* Coville Death Val. Rep. 74. Arborescent shrub, 12 feet high, the stems 4 inches in diameter. On dry hillsides often forming extensive thickets which are conspicuous from a long distance when in bloom, from the abundance of the showy yellow flowers. The dense hairs which clothe the capsules are stinging to the flesh. Fls. May; Fr. August. Abundant along the northern, or desert, base of the San Bernardino Range from Cushenberry Cañon to Antelope Valley. Rare on the southern side of the Range; Lytle Creek. Also near San Diego, *Ganong*.

Rhamnus Californica Esch. Shrub, 12 feet high, with slender stems. Fls. April–June; Fr. Sept. Throughout the mountain region at from 2500 to 5000 feet altitude on the southern slope of the San Bernardino Range to the Coast.

Rhamnus Californica var. *tomentella* Brew. & Wats. *R. tomentella* Benth. Greene Fl. Fr. 80. Coville, l. c. 78. Like the species in habit and size, and of the same range, but less abundant.

Æsculus Californica Nutt. Small tree, or arborescent shrub. 15 feet high, trunk 6 inches in diameter, usually forming groves on hillsides; when solitary with rounded compact head. Fls. June. A single tree, edge of Antelope Valley, but abundant in the Cañada de las Uvas, at Ft. Tejon, a few miles over the Los Angeles County line. The reference to its occurrence in the San Bernardino Mountains, in the Forestry Report of the 10th U. S. Census (ix. 44) is unsupported by any data.

Acer glabrum Torr. Shrub, 5 feet high. Rare. Head-

waters of Mill Creek, San Bernardino Mountains, at 6000 feet altitude.

Acer macrophyllum Pursh. Small tree, 20 feet high, with slender trunk; often in small clumps from a common root. Fls. March; Fr. May. Common but not abundant in cañons on the southern slope of the San Bernardino Range, from San Gorgonio Pass to Los Angeles, at about 2500 feet altitude.

Negundo Californicum T & G., Fl. i, 250. *N. accroides* Mœnch., var. *Californicum* Sargent, Gard. & For. ii, 364. *Acer Californicum* Greene Fl. Fr. 76. *A. Negundo*, L., Coville, l. c. 81. Tree 30 feet high, the trunk a foot in diameter. Leaves pinnately 3–5 foliate. Fls. March. Rare. San Bernardino Mountain, on a wet, rocky flat in a cañon above Yucaipe, at 3500 feet altitude.

Dalea arborescens Torr. The type is a fragment in the Torrey Herbarium at Columbia College, ticketed, "Fremont's 2d Exped., April 15, 1844. Mountains of San Fernando, a Southern continuation of the Sierra Nevada. A small tree." According to Fremont's Journal he was at that date in or near what is now known as Antelope Valley. It has not been met with since, although the region passed over by Fremont has been carefully examined with a view to its rediscovery by Mr. Pringle and by the writer. A low shrub, 3–4 feet high (*645 Parish*, May, 1882, distributed as *D. Californica*,) growing in ravines of the Mojave Desert at Fishponds, about 80 miles further east, agrees with the description of the species except as to size and the numerous deciduous yellow glands of the young shoots. The original character given is "*fere eglandulosa*," but the deciduous glands might easily have been absent in the insufficient type specimen. Prof. Sargent indicates in the Sylva that this is probably identical with the Fremontian plant.

Dalea spinosa Gray. Small tree 25 feet high, with intricate, bushy top; nearly leafless; the trunk, 10 inches in diameter, of an ash-gray color, as are the branches and slender twigs. Fls. June. Common in the dry washes of the Colorado Desert. Agua Caliente, (Palm Springs;) Indio; Vallecito; Carriso; etc.

Olneya Tesota Gray. Rough, spreading tree, 20 feet high, the

trunk hardly a foot in diameter. Flowers often 8–10; pod viscid, rough hirsute, and with some tack-shaped glands. Dry washes of the Colorado Desert from Indio to the Colorado River. Mesquite Cañon, etc. Larger and more abundant in Arizona.

Parkinsonia aculeata L. "Hills of the Colorado, near Ft. Yuma, *Schott.*" Torrey, Mex. Bound. 59.

Parkinsonia microphylla Torr. "Colorado River, near Ft. Yuma," Torrey, l. c. These two species of Southern Arizona have not been observed by recent collectors at the above station.

Parkinsonia Torreyana Wats. Straggling tree, 15 feet high, trunk 10 inches in diameter. Fls. April. Frequent in dry washes of the Colorado Desert from Toros to the Colorado River; Indian Wells, etc.

Prosopis juliflora DC. Straggling tree 20 feet high, usually several stemmed from the base, or arborescent. In various kinds of soil, but indicating a damp subsoil, and attaining its greatest development in the desert. Fls. (at San Bernardino) May; Fr. September. Throughout the entire desert region, scattered, or rarely, as at Indio, forming groves. As a shrub extending as far west as San Bernardino, Temecula, and San Diego.

Prosopis pubescens Benth. Arborescent shrub, 15 feet high, with slender stem. Common, but less abundant than the last, through the desert region, usually growing in ravines or the borders of dry washes. Whitewater; Warm Springs, etc.

Acacia Greggii Gray. Armed shrub 2–10 feet high, forming dense thickets of small extent, usually on dry hillsides. Western border of the Colorado desert at 2000–3000 feet altitude; San Gorgonio Pass; San Felipe. Also at Warner's Hot Springs, within the intramontane district.

Prunus emarginata Walp., var. *mollis* Brewer. Arborescent, the slender stems 10–15 feet high, usually several clustered. Leaves and stipules glandular toothed, lower surface of leaves sparsely hirsute, peduncles and petioles tomentose with long, soft hairs. Fls. June. Rare. Border of streams in ravines, Bear Valley, 6000 feet altitude, San Bernardino Mountains.

Prunus demissa Walp. *Cerasus demissa* Greene, Fl. Fr. 1. Shrub 2–6 ft. high, on hillsides, often in open patches.

Fls. May–June; Fr. August. Not uncommon in the Cuyamaca and San Bernardino Mountains at about 4000 feet altitude. Waterman Cañon; Mill Creek; etc.

Prunus ilicifolia Walp. *Cerasus ilicifolia* Nutt. Greene, l. c. 50. Shrubby, or arborescent and 15 feet high, with trunk 6 inches in diameter. Fls. April to June, according to altitude. Fr. red, pulpless, and astringent, October. Common on gravelly benches and hills from 4000 feet altitude on the southern slope of the San Bernardino range to the Coast. A more tree-like form of Santa Catalina Island, first collected by *Lyon*, is *P. occidentalis*, Lyon, Bot., Gaz. xi, 202, 333; Greene Bull. Calif. Acad. ii, 395. *P. ilicifolia*, var. *occidentalis* Brandegee, Proc. Calif. Acad. 2d. Ser. i, 209; Zoe, i, iii. *P. ilicifolia* var. *integrifolia* Sudworth, Gard & For. iv, 51.

Cercocarpus parvifolius Nutt. Arborescent, 12 feet high, the slender stems 4 inches in diameter. Fls. March; Fr. August. Southern slope of the San Bernardino range as high as 3000 feet altitude, passing along washes far out into the plains; thence throughout the Coast mountains.

Cercocarpus ledifolius Nutt. Small tree, 20 feet high, trunk 10 inches in diameter. Abundant on dry ridges on the northern side of the San Bernardino Mountains, at 6000 to 8000 feet altitude. Bear Valley; Holcomb Valley.

Heteromeles arbutifolia Nutt. Compact shrub, 12 feet high. Fls. June; Fr. December. Common on hillsides from 2500 feet altitude on the southern slope of the San Bernardino Range to the Coast, and on the adjacent islands.

Lyonothamnus floribundus Gray, Proc. Am. Acad. xx, 291, Lyon, Bot. Gaz. xi, 333. Brandegee, Zoe i, iii, t. 5. Small tree, growing in groves on the sides of cañons on Santa Catalina Island; endemic, and first collected by *Lyon* in July, 1884, in flower.

Cereus giganteus Engelm. Said to occur along the Colorado River, (Engelmann, Bot. Calif. ii, 450), but there seems to be no evidence of its presence in the State.

Cornus Nuttallii Audubon. Slender tree, 25 feet high, the trunk 10 inches in diameter, or often arborescent. Banks of

streams in the San Bernardino Mountains, at from 4000 to 5000 feet altitude.

Sambucus glauca Nutt. Small tree, 15 feet high, trunk a foot in diameter, and hollow, or reduced to a shrub. At lower altitudes the leaves are mostly deciduous in summer, starting again with early rains in December or January. Fls. April, May. Fruit blue or white, and with a white bloom, agreeable, July, August. Common on dry soil from about 4000 feet altitude on the southern slope of the San Bernardino range to the Coast, and on the island of Santa Catalina.

Sambucus Mexicana Presl. Accredited to Southern California in the Synoptical Flora, but I have been unable to verify its occurrence within the limits of the five southern counties.

Arbutus Menziesii Pursh. Small tree 15–25 feet high, the trunk 4–8 inches in diameter. A single small group among oaks, on the Mount Wilson trail, south side of the San Bernardino range, at 2300 feet altitude. *Davidson, McClatchie.*

Fraxinus Oregana Nutt. Small tree 25 feet high, trunk a foot in diameter, or more frequently arborescent, 8–15 feet high, and growing in thickets. Fl. April; Fr. September. Dry slopes, northern base of the San Bernardino Mountains, at 4000 feet altitude, Burcham's Ranch. On the southern slope from 3000 feet altitude (Lytle Creek; City Creek;) to the San Bernardino Valley, 900 feet altitude. Also in the San Jacinto Mountains, and at Warner's Hot Springs.

Chilopsis saligna Don. *C. linearis* DC., Coville, Death Valley Rep. 174. Small tree, 20 feet high; trunk 8 inches in diameter, or arborescent. Fls. June. Dry washes of the Colorado and Mojave Deserts, common; also as a shrub at Brookside, near Redlands, and in the San Jacinto Valley.

Umbellularia Californica Nutt. Arborescent, 20 feet high, growing in groups, seldom, if ever, a tree. Fls. March. Common along the bottoms of cañons, southern slope of the San Bernardino Range at 2000 to 2500 feet altitude.

Platanus racemosa Nutt. Spreading tree 75 feet high, the trunk 4 feet in diameter; in the mountains sometimes arborescent, Fls. April; Fr. September. Common near watercourses, from

3000 feet altitude, on the southern slope of the San Bernardino Range to the Coast. A tree growing in sandy loam at San Bernardino measures 9½ feet in circumferance at 3½ feet from the ground; height about 60 feet. Another similarly situated is 13 feet 3 inches in circumference; broken off about 25 feet from the ground.

Juglans rupestris Engelm. in Torr., Sitgs. Rep. 171 t. 15; Sargent, 10th Census ix, 131. *J. Californica* Wats., Bot. Calif. ii, 93; Greene, Fl. Fr. 74. Arborescent shrub 15 feet high, growing in clumps, or rarely a tree 30 feet high, the trunk a foot in diameter. In cañons on the southern slope of the San Bernardino Range up to 3000 feet altitude, and occasionally along washes at some distance from the foot of the mountains.

Myrica Californica, Cham. Arborescent, in clumps, 12 feet high. Collected only in Rustic Cañon near Santa Monica, where, according to Dr. Hasse, it is scarce, and grows in shady, springy places.

Quercus lobata Née. Fort Tejon, a few miles over the Los Angeles boundary, in Kern County, is situated in a grove of magnificent oaks of this species, some of them 7 and 8 feet in diameter. Within our limits it has been reported from La Liebre Rancho in Antelope Valley.* A single tree has been observed by Dr. Hasse at Santa Monica. It may be expected in the intervening mountains.

Quercus Douglasii H & A. This species barely reaches Los Angeles County on the desert side of the Liebre Mountains (*Coville*).

Quercus Engelmanni Greene, W. Am. Oak. 33, t. 17. *Q. oblongifolia* Engelm., Bot. Calif. ii. 96. Rather spreading tree, 40 feet high, the trunk 3 feet in diameter. Coast mountains of San Diego County, 15–20 miles from the sea, where it covers the hills in open groves; Pala; Fallbrook; etc. Rare on the interior slope of the same mountains; Marietta. Reported in the Bot-

*Merriam, N. A. Fauna vii, 333. Sargent's reference to the "San Bernardino Mountains" (10th Census ix, 138), probably applies to the same region, as no other station is known.

any of California at San Gabriel, but not met with there by recent collectors.

Quercus Macdonaldi, var. *elegantula* Greene, l. c. 26, 86, t. 29. The type of this oak was a tree 20 feet high, with a trunk a foot in diameter, discovered by Prof. Greene in 1885, in Temecula Cañon near Fallbrook. As a shrub from 4 to 12 feet high, and exhibiting great variation in shape and size of leaf and fruit, it is not uncommon from Fallbrook to McGee's store, near Temecula. Apparently it is confined to the region jointly occupied by *Q. Engelmanni* and *Q. dumosa*, between which species it is probably a cross, as was suggested by its proposer.

Quercus chrysolepis Liebm. Spreading but compact tree 40 feet high, the trunk 2 feet in diameter, or sometimes reduced to a shrub. Wood hard and brittle. Cañons of the San Bernardino Range, from 1000–5000 feet altitude on the southern slope, and from 5000–6000 feet on the northern.

Quercus Wislizeni A.DC., var. *frutescens* Engelm. Small tree, 20 feet high. Dry hills on the desert slope of the Sierra Liebre Mountains, between Elizabeth Lake and Tejon Pass.

Quercus agrifolia Née. Occasionally a large, spreading tree, 70 feet high, the trunk 4 feet in diameter, (Edgar Cañon, San Gorgonio Pass, altitude 2800 feet;) oftener of smaller size, 30 feet high and the trunk 18 inches in diameter. Widely distributed, but usually not very abundant, especially throughout the coast mountains, Fallbrook; Temecula; Marietta. Santa Monica Range, *Hasse*. Also about Pasadena, where it covers the hills with open groves.

Quercus Kelloggii Newberry. *Q. Californica* Cooper, Smith. Rep. 1858, 261; Sudworth, Gard. & For. v, 98; Coville, l. c. 196. Tree of spreading, open habit, 70 feet high, the trunk 4 feet in diameter, or at high altitudes reduced to a shrub. Fls. May–June. Common throughout the coniferous belt of the San Bernardino Range and the San Jacinto Mountains, at from 4000 to 8000 feet altitude.

Castanopsis chrysophylla, A. DC. Low shrub, 1 to 4 feet high, covering the slopes of the higher mountains, at from 7000 to 9000 feet altitude, with a dense and impenetrable chaparral.

Fls. June. Bear Valley; San Jacinto Mountains; San Antonio Mountain.

Alnus rhombifolia Nutt. Parry, Bull. Cal. Acad. ii, 351. *A. oblongifolia* Torr. Slender tree, 50 feet high, the trunk 2 feet in diameter. Fls. January. Abundant along streams from 3000 feet altitude on the southern slope of the San Bernardino Range to the Coast. San Jacinto Mountains; Cuyamaca Mountains. Santa Monica, *Hasse*.

Salix nigra L. Fort Mojave, the station noted for this willow in the Botany of California, is in Arizona, but it may be expected on the Californian side of the Colorado. Mr. Bebb informs me that there is in his herbarium a specimen of the subvar. *venulosa* Anders., a pubescent form of the var. *longipes*, Anders., collected by Dr. J. T. Rothrock at Elizabeth Lake, No. 187, Survey of the 100th Meridian. I have been able to find no other evidence of the existence of this tree within our limits.

Salix lævigata Bebb. "Black Willow." The largest of the Southern California willows, 25 feet high, the trunk 18 inches in diameter, or infrequently shrubby. Fls. April. By streams or in meadows; common from 2000 feet altitude on the southern slope of the San Bernardino Range to the Coast, and on Santa Catalina Island.

Salix lasiandra Benth., var. *lancifolia* Bebb. Rarely a small tree, 20 feet high, the trunk 10 inches in diameter; usually reduced to a shrub. Fls. May. Situation and continental range of the last species.

Salix longifolia Muhl. Reduced to a shrub. Sandy banks of streams, away from the water. Borders of the Colorado Desert, at Agua Caliente (Palm Springs), also at Lytle Creek near San Bernardino. This wide-spread species probably has a more extended range in this region than here indicated, but material and records are wanting for its definition. It is with difficulty distinguished from some forms of *S. sessilifolia* Nutt., a very common and very variable willow of the region.

Salix flavescens Nutt. Reduced to an arborescent shrub, 12 feet high. Fls. June. Stream banks in the San Bernardino Mountains at from 7000 to 8000 feet altitude.

Salix lasiolepis Benth. "White Willow." Arborescent, or sometimes a small tree, 20 feet high, the trunk 10 inches in diameter. Fls. December and January, many of the leaves persisting later. Common by streams and in meadows, from 3000 feet altitude on the southern slope of the San Bernardino Mountains to the Coast.

Populus trichocarpa T. & G. "Black Cottonwood." Small tree, 40 feet high, the trunk 18 inches in diameter. Fls. March. Along mountain streams from 3000 feet altitude on the southern slope of the San Bernardino Range to the Coast; also on Santa Catalina Island.

Populus Fremonti var. *Wislizeni* Wats. Spreading tree 80 feet high, the trunk 4 feet in diameter; or in the desert region often reduced to a straggling, misshapen tree 25 feet high, with trunk not exceeding 18 inches in diameter. Fls. February, March. Three trees on sandy loam at San Bernardino measure respectively 12 feet 4 inches, 11 feet 10 inches, and 8 feet 5 inches in circumference, each being about 70 feet in height. Prevalent throughout the entire region, mostly in the neighborhood of water. It ascends the southern slope of the San Bernardino Range to 2000 feet altitude, and the northern slope to 3500 feet. In the San Bernardino and San Jacinto Valleys there were formerly extensive groves of large trees now nearly destroyed. There is also a narrow fringe of large trees along the Mojave River from opposite Hesperia to Camp Cady. Elsewhere in the desert region the tree is sparsely present along water courses in the cañons, or, where the water is permanent, fringing its borders, as at Morongo Creek.

The species is reported in the 10th Census Report (ix, 175) as collected at "Colton, *Parry*," but I have been unable to detect it, and the late Dr. Parry was not aware of its existence at that station.*

Yucca baccata Torr. Occasionally 15 feet high, with trunk less than a foot in diameter, or acaulescent, branches short, stiff

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* *Populus monilifera* Ait. Trees referred to this species by Prof. Sargent, are in cultivation at Colton as street shade trees. Their origin is uncertain, and the species has never been found in a wild state in this region.

and irregular. Fls. March. Attaining its greatest development in the desert region, throughout which it is scattered, either solitary, or rarely in small groups, on dry hillsides or in washes, up to 4000 feet altitude. In similar places, but less frequent and smaller, from 1500 feet altitude along the southern base of the San Bernardino Range to the coast. In the Death Valley Report, page 202, Mr. Coville restricts the name *Y. baccata* to the acaulescent forms, separating those with trunks as *Y. macrocarpa* Coville, *non* Engelm. on the ground of their arborescence, smaller flowers and yellowish-green leaves.

Yucca brevifolia Engelm., Bot. King Exp. 496; Trelease, 4th Rep. Mo. Bot. Gard. 193. *Y. arborescens* Trelease 3d Rep. 163; Merriam, N. A. Fauna vii, 353; Coville, Death Vall. Rep. 201. Uncouth tree, angularly branched, 30 feet high, trunk 18 inches in diameter. Fls. April; Fr. August. On dry benches and hills along the northern base of the San Bernardino Range, from Cushenberry Springs to Gorman's Ranch, at the upper end of Antelope Valley, occupying a belt between 2500 and 4000 feet altitude and forming an open forest, interrupted in places, and varying in width, the greatest said to be opposite the Cajon Pass, 12 miles *(Merriam)*, where a few trees are also found a short distance south of the summit. At Cactus Station, at the head of Cushenberry Cañon, there is a considerable grove at 5000 feet altitude at the Upper edge of the piñon belt. An interrupted belt is also found between Daggett and Pilot Knob *(Merriam)*.

Washingtonia filifera Wendl. *W. robusta* Wendl. Handsome tree 60 feet high, the trunk 3 feet in diameter. A cultivated tree at Los Angeles, 42 years old, measures 60 feet in height and 10 feet 7 inches in circumference. One at San Bernardino in adobe soil, 22 years old, is 32 feet high and 9 feet 2 inches in circumference. Flowers on the desert in June, and fruit ripens in September; cultivated trees at San Bernardino flower in August, fruit ripening in February. This palm grows, often in extensive groves, in wet and usually alkaline soil at the bases of the mountains along the eastern borders of the depression in the Colorado desert once occupied by an inland sea; a few scattered trees mark the channel by which it was connected with the Gulf of California (*Orcutt.*) The groves extend for several miles up

some of the cañons of these mountains; smaller groves are found in the cañons of the San Jacinto Mountain, near Agua Caliente (Palm Springs), and a few trees in the Whitewater Cañon on the eastern side of the San Bernardino Mountain mark the western limit of the species.

Washingtonia robusta is an obscure species, described from young cultivated plants, and has never been identified with any uncultivated trees. Its identity with *W. filifera* can hardly be doubted. See Watson, Proc. Am. Acad. xxv, 136; Parish, Gard. & For. iii, 51, 542; Orcutt, W. Am. Sci. i, 63, 76.

Pinus Lambertiana Dougl. Tree of large size, 200 feet high, trunk 8 feet in diameter. Scattered throughout the higher mountains at from 5000 to 7000 feet altitude, usually in the richer and moister sort of flats and cañons. San Bernardino and San Jacinto Mountains.

Pinus albicaulis Engelm., Trans. St. Louis Acad. ii, 209; Bot. Gaz. vii, 4; Coll. Wks. 329, 383. *P. flexilis* James var. *albicaulis* Engelm., Bot. Calif. ii, 124. Tree 40 feet high, the trunk 2 feet in diameter, or at its upper limit gnarled and prostrate and but a few feet in height. On Grayback Mountain, constituting the upper edge of the timber belt, and extending from 1000 feet below the summit (11,725 ft.) to within 100 feet of it. Dead trees, probably of this species, are scattered up to the summit. (*W. G. Wright.*) This is the Southern known limit of this pine.

Pinus Parryana Engelm. Symetrical tree, 20 feet high, trunk a foot in diameter. Forms extensive forests on dry mountains in Lower California, a few trees probably straggling across the boundary; a single one observed near Larken's Station June, 1890, in flower.

Pinus monophylla Torr. & Frem. Irregular tree, 30 feet high, the trunk 18 inches in diameter. Fls. June; Fr. Sept. Rocky cañons and ridges on the north side of the San Bernardino Mountains, from Cushenberry Springs to Cox's Ranch. Reported by Bigelow (Pac. R. R. Rept. iv, 15), from Cajon Pass, but not now found there.

Pinus Torreyana Parry. Sea coast hills at Del Mar, San

Diego County; until recently the only known locality for this species, but a second small grove has been discovered on Santa Rosa Island.

Pinus ponderosa Dougl. "Yellow Pine." Noble tree 200 feet high, with a trunk diameter of six feet. Fls. June. Ridges and slopes, or of a larger size on flats, at from 4000 to 11,000 feet altitude, throughout the San Bernardino Range, the San Jacinto and Cuyamaca Mountains, forming the greater part of the coniferous forest.

Pinus Jeffreyi Balf. "Black Pine." Denser-headed tree, 75 feet high, the trunk 3 feet in diameter. Range of the last, usually on flats or near streams; scattered and not abundant, and probably absent above 8000 feet altitude.

Pinus Murrayana Balf. Spreading tree 50 feet high, trunk-diameter, 2 feet. Grayback Mountain, scattered through the upper part of the yellow pine belt, between 10,000 and 11,000 feet altitude. (*Wright.*) A few small groups on low gravelly points at the lower end of Bear Valley, in the San Bernardino Mountains, at 6000 feet altitude.

Pinus Sabiniana Dougl. "Sierra La Liebre, descending nearly to Antelope Valley." *Merriam*, N. A. Fauna vii, 336. This is the only authentic locality in the Southern counties. It has been reported (Orcutt, 1st Calif. For. Rept., 50) from San Diego County, but apparently erroneously.

Pinus Coulteri Don. "Big-cone Pine, Bull Pine." Somewhat spreading tree, 50 feet high, trunk-diameter 2½ feet. Usually on dry ridges, less frequently on gravelly benches (Mill Creek), at from 5000 to 6000 feet altitude, in the San Bernardino and San Jacinto Mountains.

Pinus tuberculata Gordon. *P. attenuata* Lemmon, Min. & Sci. Press, Jan. 16, 1892; Gard. & For. v. 65; N. Am. Conebearers 10; Erythea .i, 229. Sudworth U. S. For. Rept. 1892, 329. Coville Death V. Rept. 221. Regular and handsome tree, branched from the ground, 15 feet high, trunk, 8 inches in diameter. An interrupted belt, 5 miles long and one-half mile wide along the southern slope of the San Bernardino Mountains, at about 3000 feet altitude, from East Twin Creek to

City Creek. Reported by Sargent (10th Census ix, 194), from the San Jacinto Mountains, but this needs confirmation.

Pseudotsuga macrocarpa, Lemmon, 3d Calif. For. Rep. 134; W. Am. Coneb. 12; Sudworth, U. S. For. Rep. 1892, 330. Coville, Death Val. Rep. 223. *P. Douglasii*, Carr. var *macrocarpa* Engelm. Rather irregular tree 150 feet high, 4 feet in trunk-diameter. Bears light crops of cones, the reported fecundity perhaps exceptional. Throughout the San Bernardino Range from the Sierra Liebre east to Grayback Mountain, most abundant on the south slope, where it is usually scattered on the sides of cañons, between 2500 and 5000 feet altitude, but on Mount Wilson said to form "extensive forests" (*McClatchie*.) On the northern slope rare, and at higher altitudes; Gold Mountain, 7000 feet altitude. Also on San Jacinto Mountain, and in San Felipe cañon (type) between Banner and Julian. The technical characters of the species are weak, but it may perhaps be maintained for the sake of the difference in appearance and character of wood between it and its northern relative.

Abies concolor Parry, Am. Nat. ix, 304. Sudworth, Torr. Bull. xx, 42; *A. Lowiana* Lemmon, W. Am. Coneb. 14. Stately tree 150 feet high, 4 feet trunk-diameter. In cañons, on flats, or on ridges, scattered or in small groups, throughout the coniferous belt in the San Bernardino Range and the San Jacinto Mountains, at from 4000 to 8000 feet altitude.

Sequoia sempervirens, Endl. In the First Calif. For. Rep. 27, reprinted in 2d U. S. For. Bull. 201, a small grove of redwood is reported as growing in a remote part of the "Sierra Madre" Mountains of Los Angeles County. Mr. Abbot Kinney informs me that after a careful examination of the supposed location of the grove he has proved this report to be unfounded.

Libocedrus decurrens Torr. Handsome tree, 150 feet high, trunk 5 feet in diameter. Usually in cañons or on flats, scattered, at from 4000 to 7000 feet altitude, throughout the San Bernardino Range and the San Jacinto Mountains.

Cupressus Guadalupensis Watson. "Ravines near the Old Mission, San Diego, not abundant." (*C. R. Orcutt, in lit.*)

Juniperus Californica Carr. Small tree, 20 feet high, trunk

diameter 8 inches. Fls. February; Fr. September. Dry plains or hills, scattered, or occasionally in groves, at from 1000 to 3000 feet altitude, from the southern slope of the San Bernardino Range to the Coast Mountains (San Bernardino; Temecula). On the northern slope abundant and sometimes larger, scattered through the upper part of the *Yucca brevifolia* belt, between 3000 and 4000 feet altitude, extending from Cushenberry Cañon to the upper end of Antelope Valley.

Juniperus occidentalis Hook. Tree, 40 feet high, the trunk 2 feet in diameter. Northern side of the San Bernardino Mountains, at 6000 to 7000 feet altitude. Bear Valley; between Halcomb Valley and Green Lead, forming a considerable forest, unmixed with other coniferous trees.

NOTES ON LEPIDOPTEROUS LARVÆ.

BY C. H. TYLER TOWNSEND.

I. LEPIDOPTEROUS LARVÆ WHICH BORE THE FLOWER-STALKS OF DASYLIRION.

Several lepidopterous larvæ were found May 18, 1892, in a dead flower stalk of *Dasylirion wheeleri*, on Tortuga Mountain, which is on the Mesa about five miles to the southeast of Las Cruces, New Mexico. The stalk containing these larvæ was an aborted one, which for some reason had died when it reached the length of a foot and a half, but had still become hard and woody. Probably the death of the stalk was caused by the larvæ, which were found boring in tunnels inside its base, like coleopterous larvae.

Description of Larva.—Length, 30 to 42 mm.; width of mesothoracic segment, 6⅓ to nearly 7 mm. Whitish, nearly naked, elongate, widest anteriorly (on mesothoracic segment), with three pairs of quite well-developed thoracic legs, and five pairs of distinct but aborted and approximated prolegs. Head and dorsum of prothoracic segment corneous, of a tawny brownish tinge; rest of larva fleshy. Head about one-half width of mesothoracic segment, base retracted within prothoracic segment, sparsely hairy on

anterior portions. Antennæ three-jointed, first two joints cylindrical and of same length, basal joint about twice the diameter of second, third joint very small and short, second joint with a terminal bristle and an additional short one arising beside the third joint. Mandibles strong, faintly notched on apical edge, showing three distinct teeth. Maxillary palpi four-jointed, basal joint short and stout, second joint about same diameter but three times as long; third joint nearly as long as second, about one-half the diameter of latter, cylindrical; third joint minute. Labial palpi two-jointed, slender and elongate, basal joint tubercle-like and short; second joint elongate, not as thick, subcylindrical. Spinneret elongate and tapering to a point, longer than labial palpi. Prothoracic and metathoracic segments about equal in width, a little narrower than the mesothoracic. Abdominal segments a little narrower still, and about equal in width from segments 5 to 11; 12 and 13 gradually and successively narrowed, 13 with a transverse dorsal crease midway making it appear as 2 segments. Segments 2 to 4 (thoracic) about equal in length; 5 and 6 much shorter, nearly equal; 7 to 11 longer than thoracic, about equal, or 9 and 10 somewhat the longest; 12 and 13 shorter and nearly equal in length. A few hairs on dorsum of prothoracic segment, and on anal segment, very few on other segments.

Described from three specimens.

In the same stalk with the above there was also found a live lepidopterous pupa, which can hardly belong to the same species as the larvæ since it is so much smaller in size. It may be briefly described as follows:

Pupa.—Length, 16 mm.; width on thorax, 4½ mm. Elongate, pale flavous brownish in color; terminated anteriorly with a stout and short process, which ends in a point on a level with the ventral surface. Eyes at inferior base of this process. Antennal, leg, and wing sheaths reaching to fifth abdominal segment; antennal sheaths consisting of many short joints, gradually growing slightly longer and narrower toward end of sheath. Dorsal portion of each abdominal segment with an anterior transverse row of short, stout, sharp-pointed spines, their tips brown; and a posterior row of much smaller, more closely approximated and even spines. Anal segment is appar-

ently without this posterior row, but has instead a terminal circlet of spines of different sizes, a lateral one on each side much the largest and rather claw-shaped, with the point directed inferiorly. The other spines are much smaller.

Described from one specimen.

II. LYCÆNID ON MESQUIT.

Four specimens of a beautiful light green lycænid larva were beaten, May 16, 1891, from *Prosopis juliflora* south of Mesilla, New Mexico. At the time of capture, they measured from 5 to 7 mm. long, and were of the exact shade of green of the mesquit leaves. They feed on the underside, thus escaping observation. The head, in these and other lycænid larvæ, appears to the naked eye as a small black tubercle on the ventral aspect of the cephalic end of the body, which with their other characters gives them much the appearance of certain dipterous larvæ.

Description of Larva.—Length (strongly curved), 4 to 7 mm.; greatest width, 2 to 3 mm.; greatest thickness, 2 mm. Quite similar in general outline and appearance to the lycænid on *Atriplex* described by the writer, from Arizona (Am. Nat. 1893). Differs only as follows: Light green in color, with a thick clothing of minute and more spinous tubercles, from each one of which springs a minute hair. With or without the median and lateral rows of reddish spots on segments 3 to 10 (two with and two without). One of the specimens, with the red spots, has also a more or less yellowish area on each side of the median row of spots. The dorsa of segments strongly or hardly at all produced into the raised transverse ridges (one strongly, two moderately, and one very faintly). Anterior segments gradually increasing in width, to segment 6, segments 6 to 10 about equal in width, posterior ones narrowing to anus. Some or none of the minute black spinous tubercles interspersed among the whitish ones (more in two cases—same two specimens referred to above as having the rows of red spots; and a considerable number along dorsal region in the other two). All four differ in having none of the short and stout black spines on anterior portion of dorsum

of prothorax, which instead is longer hairy especially on borders; moreover all the segments (except head) present a pubescent appearance, being covered with the short hairs arising from the spinous tubercles, these hairs usually (in three specimens—not in the faintly humped one) becoming longer on the dorsum along the median row of hump-like transverse ridges. The pubescence in these three specimens (above mentioned) also becomes somewhat longer along the sides of the larva. Head not so glabrous, black, but not so polished. Eyes apparently nearly the same. Mandibles apparently nearly the same. Legs and prolegs same; spiracles same, consisting of 9 pairs, on sides of segments 2, and 5 to 12, those on 11 and 12 situated more on dorsum of segments.

Described from four specimens. Southern N. Mex. General colors noted in life. It had occurred to me that possibly there were two species represented in the above larvæ, but their uniform pubescence and the connecting variations between them lead one to consider them as belonging to the same species. Their pubescence seems to point them out at once as distinct from the species on *Atriplex*.

Mr. W. H. Edwards has treated in a most interesting manner of the special organs of segments 11 and 12 in the larva of *Lycaena pseudargiolus* (Butt. N. Am. vol. ii. Lycaena ii, iii, pp. 10–16). A figure is given of the last segments (p. 14), showing these organs. All of the four larvæ above described from mesquit show the organs very plainly; the median transverse opening on 11, and the two tubes on 12 wholly withdrawn inside and showing as a rounded stigma-like organ with many wrinkles radiating from the centre.

III. LARVA OF OIKETICUS TOWNSENDI (RILEY MSS).

This species is our common bag-worm in Southern New Mexico. Some detailed notes have been published on this species in the *Can. Ent.*, 1892, p. 199, under the name "*Thyridopteryx* sp." Specimens had been sent to Dr. Riley, who wrote me too late for insertion in the above-mentioned notes that the insect proved to be a new species of *Oiketicus*, which he would describe at some future time under the above name. The present seems an ap-

propriate time to publish the following description of the larva, which was drawn up some time ago.

Larva.—Length (after being much contracted in alcohol), 20 to 32 mm.; greatest width (7th and 8th segments), 7½ to 10½ mm. Black, naked except a few hairs on head and thoracic feet, head and thoracic segments corneous dorsally and variegated with whitish, rest of body fleshy. Three pairs of strong 3-jointed thoracic legs, each armed with a stout terminal claw; five pairs of prolegs, on segments 7 to 10 and 13. The lateral plates of dorsa of segments are hardly whitish, or faintly so anteriorly in continuation of the whitish lateral line of thoracic segments. There is also an inner lateral line on each side on each of the thoracic segments, and a median line on the prothoracic and mesothoracic only. The prolegs, with lateral portions of ventral surface, are also more or less whitish. Head is considerably narrowed, about half retracted within prothoracic segment. Antennæ 3-jointed, first joint very stout and subconic with a truncate apex, about as long as basal diameter; second joint very short and retracted within the basal joint so that it is not conspicuous; third joint slender and subcylindrical, nearly as long as basal joint but not more than one-third its mean diameter, terminated by a bristle nearly three times its own length. Maxillary palpi 4-jointed, basal 2 joints subequal, stout; third joint hardly as long and about one-half the diameter of second; fourth joint minute. Labial palpi slender, consisting of a basal elongate subcylindric joint terminated by a stout, pointed, bristle-like style about its own length, with a minute joint at its base. Spinneret elongate, slender, pointed. Labium with a deep notch on anterior margin, bristly. Mandibles very strong, strongly 4-toothed apically. Head is in younger specimens mostly whitish, only finely marked or speckled with blackish or brown. Prothoracic segment a little wider than head, fully or more than one-half as long as wide; mesothoracic segment wider than prothoracic but only one-half as long; metathoracic slightly wider than mesothoracic, and about same length, as is also the fifth segment (first abdominal), which latter is a little wider than metathoracic. Segments 6 to 11 very gradually increasing in length, 11 being the longest; 12 a little shorter and narrower; 13 a little long

and still more narrowed, with a transverse dorsal crease on anterior two-thirds, making it appear as two segments. In contracted alcoholic specimens the seventh and eighth segments are the widest; but in a fresher specimen the mesothoracic to eighth segments are about same width, 9 and 10 hardly narrower. Anal prolegs more developed than others.

Described from six alcoholic specimens, five, including the largest, collected March 15, 1891. Color noted in life.

SOME NEW AND SOME OLD ALGÆ BUT RECENTLY RECOGNIZED ON THE CALIFORNIA COAST.

BY C. L. ANDERSON.

PUNCTARIA WINSTONII n. sp.

(*Class* MELANOPHYCEÆ; *Order* DICTYOTACEÆ.)

Fronds tufted, arising from a small naked disk, with very slender filamentous stipes, which gradually widen into tough, leathery, areolated lamina, thin, membranaceous, ¼–1 inch wide and 2–10 inches high, of a dark olive green color. Cells cuboidal or roundish. *Oogonia* and *tetraspores* in the same sori, the former spherical or pear-shaped. Hairs and paraphyses absent. Adheres well to paper, and in drying has a distinct odor of new leather. In the older plants there are perforations, erosions, and lacerations of the leaf.

For a long time I have wondered why species of Punctaria had not been discovered on our Coast. Last summer Mr. Harry B. Winston, a young and zealous collector of Algæ, found this species at Carmel Bay, growing on the old stems of Egregia. It seems closely allied to *P. plantaginea*, Roth., of the Atlantic Coasts in shape and color. It has probably been mistaken when young by collectors for *Phyllitis fascia*, which it slightly resembles and which is very common. It differs from *P. plantaginea* in having spherical or pear-shaped oogonia instead of cuboidal, and in the absence of hairs and paraphyses. Probably it grows on the rocks and on other algæ than Egregia, but so far has only been found on that one plant. It grows in a sheltered cove near Chinese fishing huts on the north side

of Carmel Bay where Mr. Winston and his parents have collected many novelties, and some of the most beautiful Algæ ever found on our Coast.

Prof. Farlow, who has examined specimens of this alga, is inclined to the opinion that it is the same as *Coilodesma Californica* of Ruprecht and Kjellman.. *Coilodesma* is the old genus *Adenocystis* of Hooker and Harvey, Flora Antarctica. This may be so. But our plant seems to agree so well with the Dictyotaceæ and the genus Punctaria that I am inclined, notwithstanding differences in structure of frond and fruiting, to regard it as belonging properly as above indicated until Coilodesma is proven to stand in place of Punctaria.

DESMARESTIA ACULEATA, Lmx.

(*Class*, MELANOPHYCEÆ; *Order*, ECTOCARPACEÆ.)

This alga was collected at Moss Beach, near Pacific Grove, by Bradley M. Davis, in June, 1892. The long cord-like branches and even the main stems were covered with a fine growth of branching filaments. It does not seem to be abundant, as this "find" is the only one I know of. It is common on the Atlantic Coasts and has also been collected at Kamtschatka, on the northwest coast.

DESMARESTIA VIRIDIS, Lmx.

(FUCUS VIRIDIS, *Fl. Dan.*; DICHLORIA VIRIDIS, *Grev.*)

This is a long known European alga, and was found on the Alaskan Coast, but was not discovered on the Californian Coasts so far as I know, until the summer of 1892, when Mrs. B. C. Winston collected it in Carmel Bay, adding this pretty alga to many other unexpected trophies found in the line of natural history on that beautiful bay.

NEMALION LUBRICUM, Duby.

(*Class*, RHODOPHYCEÆ; *Order*, HELMINTHOCLADIACEÆ.)

This long known alga, found in the Mediterranean and Adriatic Seas and on some Atlantic Coasts, has recently been discovered in Monterey and Carmel Bays. "Worms" is the common name in these localities, and very appropriately, for the

frond is so lubricous that it seems to creep until thoroughly dried. Our plant does not materially differ from the European except in being more robust. The fronds are mostly simple, occasionally branching dichotomously. I have only examined the cystocarpic plants, finding the fruit abundant, borne in the fan-shaped filaments near the surface of the frond.

CALLITHAMNION RUPICOLUM, *n. sp.*

(*Class* RHODOPHYCEÆ. *Order* CERAMIACEÆ.)

Fronds densely tufted, twisted, and matted at the base; alternately pinnate, pinnæ rather long and slender, distichous, emerging near middle of articulation; angles of axis obtuse. Tetraspores tripartite, oblong or obovate, borne almost always on upper side of ramuli, and near middle of articulation. The whole

Callithamnion rupicolum, n. sp.

A. Tuft of branches, natural size.

B. A magnified branch (about 500 diameters) showing the tripartite tetraspores. The fine hairs are probably a parasite, but nearly all the older plants are thickly beset not only with thin hairs, but many forms of diatoms.

plant is at times beset with very small radiating articulated threads (parasites ?). Color reddish brown. A small alga ¼-1 inch high, forming in patches on rocks and sides of cliffs at high water mark.

It is with reluctance that I add another name to the long list of Callithamnions, now already numbering more than two hundred. But this little plant, so small, so abundant, is not like any in my herbarium; and finding no description of it, I venture to enlist it as new, having but little doubt.

It grows abundantly about Monterey Bay, and I have received a specimen from Mrs. Bingham, of Santa Barbara. It may readily be distinguished by the following characters: The tetraspores and ramuli emerge near the middle of the articulation; its small size; its perennial growth; its reddish brown color; and growing on rocks and sides of cliffs at high-water mark.

BONNEMAISONIA HAMIFERA, Hariot.

(*Class*, RHODOPHYCEÆ; *Order*, LAURENCIACEÆ.)

This unique and very pretty alga has but recently been described by Mons. Hariot coming from Japan. Professor Farlow of Harvard, has had specimens from Santa Barbara but for a time considered them the same as *B. asparagoides*, Woodw., of the Irish Coasts.

In 1892 Mrs. Winston, Bradley M. Davis, M. A. Howe, and others collected specimens near Pacific Grove. Plants having been sent to Professor Farlow he has kindly determined them.

In the March number of *Erythea* for 1893, Mr. Howe publishes this alga in a list of his collections on Monterey Bay. As he truly says, "it is beautiful and noteworthy." One of its striking features is remarkably well-formed imitations of *fish-hooks* at and near the tips of the branchlets, much like those of *Hypnea musciformis* but more graceful.

DASYA COCCINEA, *Huds.*

(*Class*, RHODOPHYCEÆ; *Order*, RHODOMELACEÆ.)

This beautiful alga has been collected in Monterey and Carmel Bays for some years; but until the summer of 1892 was not recognized as the old world Dasya, first described by Hudson in

Flora Anglica about the beginning of this century and named *Conferva coccinea.* Afterwards C. Agardh placed it in the genus Dasya.

I am indebted to Mrs. B. C. Winston of Pacific Grove for calling my attention to it, and for a specimen. It is by no means abundant, but serves as an example of the curious fact that many European Algæ which do not appear on our Atlantic Coast are found on our Pacific Coast.

ON THE OCCURRENCE OF NYCTINOMUS MOHAVENSIS IN THE SANTA CLARA VALLEY.

BY J. M. STOWELL.

In the early part of last February the writer was informed by Mr. Edward M. Ehrhorn, Horticultural Commissioner of Santa Clara County, that the Court-house in San Jose was infested by large numbers of bats, which were taking refuge behind the iron window-shutters and disturbing the course of Justice by their constant chattering. A visit to the Court-house on February 27 showed that the state of affairs had not been exaggerated. On opening the leaves of one of the shutters, the bats were found thickly clustered in the darker recesses. They seemed extraordinarily clumsy and made little attempt to escape, only a few fluttering away after having fallen from their perch. About seventy specimens were procured and prove to be representatives of *Nyctinomus mohavensis*, with Merriam's rather meagre description of which (N. A. Fauna, 2, p. 25) they entirely agree. This species was described apparently from a single specimen procured at Fort Mohave, Arizona, March 8, 1889, since which no additional specimens seem to have been recorded. The present discovery of the species in the Santa Clara Valley gives a notable extension to its range.

We have been unable to compare *N. mohavensis* with the closely-allied *N. brasiliensis*, and Dr. Merriam neglects to point out the characters distinguishing the two species. Dr. Harrison Allen informs us that he considers both *N. mohavensis* and *N. femorosaccus* as at best geographical races of *N. brasiliensis*.

February 7, 1894.

As the first two, however, are described from essentially the same region, it would seem impossible to treat them as subspecies; and as our specimens without exception agree with *mohavensis* in the characters by which it is said to differ from *femorosaccus*, it seems best to recognize the two as valid species until further comparison is possible.

The specimens taken February 27 were all procured from the shutters of one window on the western side of the building, and consisted of males and females in about equal numbers. A second visit to the Court-house on March 3 resulted in the capture of sixty-seven additional specimens. Of these, thirty-two were taken from behind one shutter again on the west side of the building, and consisted, as before, of both sexes about equally represented. The rest of the second catch, thirty-five in number, were taken from behind four different shutters on the east side of the Court-house, and proved on examination to consist of females exclusively. This furnishes additional evidence that under certain circumstances the sexes congregate separately.

Several specimens of this bat have since been taken on the University Campus, and at the Hopkins Seaside Laboratory at Pacific Grove. We have also had the privilege of examining a specimen collected at San Diego, Cal., by Mr. C. H. Marsh. In this the lower incisors were 3-3, distinctly bilobate, and in general proportions, and shape of ear, it agreed with our specimens.

Le Conte has already called attention to the variation in the number of lower incisors in *Nyctinomus brasiliensis* ("*Rhinopoma carolinense*"), as out of fifteen individuals examined by him "one had no incisors on the lower jaw; two had five; three had four, and the rest six."* The same variation obtains in *mohavensis*. Merriam describes the lower incisors as 2-2, not distinctly bifid. But the normal arrangement appears to be 3-3, all distinctly bilobate. Thus in forty-five specimens examined as to this character, 24 specimens have 6 lower incisors; 9 have 5, and 12 individuals have 4. The outer incisor when present is very small, and so crowded forward as to occupy a precarious position in front of the canine, a fact which may account for its

* Observations on the North American Species of Bats, John Le Conte Proc. Acad. Nat. Sci., Phila., 1859, page 431.

absence in so many specimens. In by far the majority, the incisors are distinctly bilobate and the lobes have well-rounded tips; but in some specimens the tips have become more or less worn, and in a few individuals this process has proceeded so far that the upper edges of the teeth are truncate, with scarcely a trace of the median notch. In the specimens examined we have noticed that most of those with perfectly truncate incisors have the latter also reduced in number. This probably indicates that both conditions are dependent upon age.

The upper lips are pendulous, and are crimped into seven or eight perpendicular folds; and the lower lips are heavy but not crimped. The color is sooty on upper surface, with the base of the hairs whitish. The ventral surface is lighter.

I give below measurements in millimeters of eleven of these specimens. It will be seen that they agree very closely with Merriam's type of the species.

Sex.	Total Length.	Length of head and body.	Length of head.	Ear from base of antitragus.	Ear from crown.	Height of tragus.	Tail to end of vertebræ.	Exserted part of tail.	Length of humerus.	Length of fore-arm	Length of metacarpal.	Length of 1st phalanx	Length of 3d phalanx.	Length of 5th finger.
♂	91	59	21	17	13	3	33	22	26	41	42½	16	15	41½
♂	94	59	22	18½	13½	3	34	22	27	43½	43	17	16¼	42
♂	89½	57½	21	17	12½	3	30½	17	24	44	43	17½	17	43½
♀	89½	58	21	17	14	3	32	22	25	42	44	16½	15½	42
♀	94	59½	21¾	18	13	3	32	19½	26	44	44½	17	16¼	44
♀	92½	57	21½	18	12½	3	34½	22	24	43	44½	17	16½	43
♂	89½	57	19½	17¾	12	3	33	18½	24½	42	42½	16	15	42
♂	93½	58¾	20	17½	12½	3	33	19	25	42½	43½	17	16	44
♂	93½	59	20	17½	14	3	34	20	26	42	43	16¾	16	44
♀	89	59	20½	17	12	3	33½	18	26	42½	44	16	15	43
♀	93	59	19½	16	13½	3	34	21	24½	41	43	16	15	42¾

Zoological Laboratory, Leland Stanford Junior University, Jan. 12, 1894.

TAR AND FEATHERS.

BY A. W. ANTHONY.

Anyone who has collected sea birds along the Coast of Southern California has doubtless noticed a peculiar soiled condition of many of his specimens, consisting of a sticky, black substance or black stain of greater or less extent, on the breast and sides, which is frequently of such extent as to render the specimens unfit for the cabinet. Loons, grebes, and fulmars

seem to be the birds most effected in the region of San Diego, but all of the common species are apt to show black blotches at times. For a long time after the condition was first noticed I was at a loss to account to my own satisfaction for the origin. The theory that the birds had been feeding about the carcass of a whale or seal and gotten their plumage greasy from that or other sources was anything but satisfactory in view of the appearance of the stain and the species affected. Western grebes and Pacific fulmars—white phase—were sometimes seen with the entire lower plumage matted into a solid black mass, and not infrequently such birds were found dead on the beach. Whether their death was caused by the condition of their plumage I am unable to say, but from the appearance of some of the worst cases I should say that it probably had something to do with it.

As such specimens were so obviously worthless I have carefully avoided them, and until the present season my observations were limited chiefly to the living birds and those but little affected.

On July 11 of the present year, however, a *Puffinus griseus* was shot off San Diego and while the feathers of the left side and flank were glued together in a solid sheet it was by far too desirable to discard on that account, and an effort was made to save it, and after a liberal application of gasoline it was admitted to the cabinet minus a part of its plumage that was uncleanable.

This specimen—the first that had fallen into my hands in a condition suitable for examination—explained very clearly the mystery of the many stained plumages; it was due solely to a sticky, soft mass of asphalt.

I have frequently found small blotches of this substance varying from the size of a postage stamp to several inches or a foot in diameter floating about on the surface of the sea, evidently coming from some submarine source to the north, where the oil shales reach the Coast in the region of Santa Barbara.

This substance when it first comes to the surface contains enough volatile matter to render it about the consistency of molasses, and cause it to stick to anything with which it comes in contact. As the volatile gases escape it becomes hard and tough, encasing the bird that is so unfortunate as to swim into a floating mass in a coat more suitable for a turtle or armadillo than a member of the feathered kingdom.

CONTRIBUTIONS TO WESTERN BOTANY VI.

BY MARCUS E. JONES.

I. THE NAVAJO BASIN.

I propose this name for that region, both botanically and zoologically interesting, which occupies Southeastern Utah, Southwestern Colorado, Northwestern New Mexico, and Northeastern Arizona, whose limits are fairly well defined by the Colorado River and its tributaries north of the entrance of the Grand Cañon (the junction of the Little Colorado and the Colorado) as far as the Book Cliffs on the north with a northern and narrow extension along the Green River at least as far as the base of the Uinta Mountains. Its western boundary is the base of the Coal Range (Wasatch Plateau of Powell) in Utah, the Henry Mountains, and the Buckskin Mountains on the southwest. Its eastern boundary is the high country east of Grand Junction, Colorado, extending thence east of south past the base of Mt. Sneffles and thence along the edge of the mesa country through Southern Colorado and south as far as Coolidge, New Mexico, thence following the base of the northern slope of the Mogollons and including the valley of the Little Colorado to the base of the San Francisco swell near Cañon Diablo and thence north to the Colorado River. This large and isolated region belongs almost wholly to the Upper Sonoran of Merriam, and is to be considered as a subdivision of that region with a fringe of the Transition group on its edges. It has been isolated since the Miocene Tertiary, or at least since the Pliocene with its present drainage, and has been surrounded on all sides by lofty and cold mountain barriers from 7000 to 10,000 feet in average height above the sea with the exception of a very narrow stretch of country only a few miles wide and about 5000 feet above the sea from Johnson, Ariz., and Kanab, Utah, to the Colorado River, which connects with the narrow belts along the rivers belonging to the Upper Sonoran. This narrow plateau belt below Kanab has very few plants that might be classed as Upper Sonoran, but is the lowest possible ingress to the basin except the precarious one along the dark gorge of the river itself where there is very little

February 21, 1894.

vegetation as whole, and no possible means of distribution of seeds except that of the wind and birds, the former quite strong and the latter very scarce. The elevation of the region is at its lowest along the river at or near Lee's Ferry, about 3000 feet above the sea, and is warm enough for figs, almonds, and possibly oranges; the upper end is at Green River, Utah (not Wyo), and Grand Junction, Colorado, a little over 4000 feet above the sea, and a most admirable place for grapes, peaches, etc. The rainfall will not average over ten inches and for the most part will not exceed six inches. The soil is a tenacious and very barren clay for the most part, though it is gravelly and sandy on the mesas bordering the region. The species of plants found peculiar to it so far are about sixty, possibly not so many; the species of mammals and reptiles, etc., so far found are about a dozen. There are a number of new insects, but I do not know just how many. The number of species that are identical with the Upper Sonoran of S. Utah and N. Arizona is not very great, but the general character of the life is Sonoran. The climate is very hot and dry; water is scarce except on the rivers which simply pass through the region. The region is almost uninhabited and never can support much life; game is scarce, and it is a veritable desert. The country is simply a great trough with branches, and is bordered with lofty cliffs of crumbling sandstones of Triassic age which make it a very difficult thing to traverse it except by long detours. At some other time I will try to give a list of the flora and fauna of the region, and show its relation to the surrounding ones.

II. SOME NEW SPECIES.

PHLOX ALBOMARGINATA n. sp. Allied to *P. cæspitosa*, densely matted flowering stems mostly simple, 1 to 3 inches high or none, erect or ascending, 1 to 3 flowered, usually 1-flowered; leaves 2 to 3 lines long, 1 to 1½ wide, rigid, spreading, acerose, ovate to lanceolate, usually the latter; general appearance light green, mid-rib narrow and not prominent, margins cartilaginous, thick, white, glabrous except the coarsely hispid ciliate base, inner surface (that inside the cartilaginous edge) dark green, rather loosely pubescent, with short, coarse, white hairs on both sides; internodes longer than the leaves, angular, white

pubescent, with the same kind of hairs; the leaves are in pairs, with fascicles of smaller ones in the axils; upper part of stems, peduncles, leaves, and calyx very glandular as well as pubescent with coarse hairs; pedicels stout, 2 to 4 lines long; calyx narrow, 4 lines long, tube with teeth 2½ lines long, the former 5-nerved prominently and the nerves with narrow green margins; calyx lobes very narrowly subulate, acerose, 1 to 1½ lines long, not spreading much; corolla purple or lighter, purple spotted at the throat, tube ½ a line wide at base and a line wide at apex, 1 to 2 lines longer than the calyx and teeth, lobes oval, entire, 2 lines long; flower 5 lines wide; stamens very unequally inserted, small, oblong, yellow; capsule 1½ lines long, exactly oval, obtuse, apiculate with the sharp vestige of the long (4 lines) style, the point of insertion of the capsule is very weak, and the capsule readily breaks away and falls off leaving an empty calyx; lobes of the style about ⅓ a line long; placental axis is triquetrous, with one large oblong seed attached by its inner face in each cell above the middle of the concave placental wall.

This unique Phlox in its foliage resembles *Galium Mathewsii* or *stellatum*. The glandular pubescence at once separates it from any other of its class. Sometimes the stems are absent and the single flowers arise from a rosette of very short (1 to 1½ a line) leaves, on pedicels 4 lines long and with a calyx only 2 to 3 lines long; corolla not reduced. This form I call var. *minor*.

East face of Mt. Helena, Montana, May, 1891. Rev. F. D. Kelsey.

ASTRAGALUS EASTWOODÆ Jones. *A. Preussii* var. *sulcatus* Jones "Zoe" iv, 37; as *A. Sulcatus* is preoccupied.

ASTRAGALUS HAYDENIANUS Gray. This rather pretty and very odoriferous plant is of late receiving fully as many synonyms as *A. lentiginosus*. In fact, every time it has been collected but twice it has received a new name. As I have shown in "Zoe" ii, 241, there is nothing to separate it from *A. bisulcatus* except its more slender habit and white flowers. For convenience I there separated two western forms of it as var. *major* (from Johnson, S. Utah) and var. *Nevadensis* (from Palisade, Nevada). Lately Mr. Greene visits my type locality and probably the very field

where I gathered the latter variety and describes it as *A. demissus*, then Mr. Sheldon, by the aid of the Index Kewensis, gives Mr. Greene's species a new name, *A. Jepsoni*, and my first var. another, *A. scobinatulus*. An examination of Mr. Greene's description shows that his specimens, though from the type locality of the var. *Nevadensis*, are pubescent and have unequal calyx teeth. As it is the fashion now to name everything in sight, I would suggest that the var. *Nevadensis* is fully as distinct as any of the other forms, and as the name is preoccupied (Index Kewensis) it is waiting for a brand new name and will be the property of the first man who gets into print.

Sometime botanists, when they get into the field, will learn that pubescence and comparative length of calyx teeth are slim foundations on which to hang species, in *Astragalus*.

ASTRAGALUS ARTEMISIARUM. *Astragalus Beckwithii* var. *purpureus* Jones "Zoe" iii, 288. Recent studies in the field make it reasonably certain that this is distinct from *A. Beckwithii*. The chief distinguishing characters are the purple flowers, rather cartilaginous pods with the interior filled with a watery juice and stipe with a fully formed joint near the middle. *A. Beckwithii* has ochroleucous flowers a dry and rather thin pod without watery juice and a joint in the stipe which is often reduced to a dark spot in the stipe which does or does not break at that point and generally irregularly.

THE DATES OF BOTANY BEECHEY, FLORA BOREALI-AMERICANA, AND TORREY & GRAY'S FLORA.

"FLORA BOREALI-AMERICANA W. Hooker.

This work came out in parts, but as was usual at that time no official statement was published as to the dates of publication. Consequent upon this, doubts as to the actual publication of many species therein contained have been rife. The following details may help to settle those questions:

Vol. i Part 1, consisting of six sheets, pp. 1-48, came out in 1829 (cf. Linnæa, v, 1830, Litt. 102); and Seringe, *Bull. Bot.*, i (mars, 1830), 49.

Parts 2 et 3, p. 49–144 in 1830 (cf. Linnæa, vi (1831), Litt. 154).

Parts 4 to 6, end of vol. i in 1834 (cf. *Ann. sc. nat.* Ser. II, tome iii (1835), 109, "Livr. 3–7."

Vol. ii, Part 7 in 1834. See last note.

February 21, 1894.

The following dates are taken from the copy in the Library of the British Museum, as those when the respective parts were received by the Principal Librarian and denoted by stamping:

Part 8, pp. 49–96 in July, 1838.
Part 9, pp. 97–144 (same date).
Part 10, pp. 145–192, Jan. 1, 1839.
Part 11, pp. 193–241, Nov. 15, 1839.
Part 12, pp. 241 to end, July 8, 1840."

—B. Daydon, Jackson, in *Bull. Herb. Boissier*, i, 298 (1893).

"The copy of Torrey & Gray [Flora of North America] in the library of the British Museum, Bloomsbury, is in its original buff paper wrappers, and from this I can submit the following statement as accurate, so far as the dates are correctly set out on these wrappers:—

Vol. i., Part 1, pp. 1–184, July, 1838.
Part 2, pp. 185–360, October, 1838.
Part 3, pp. 361–544, June, 1840.
Part 4, pp. 545–698, Index (711), Title, etc., pp. xiv., Errata, June, 1840.

Vol. ii., Part 1, pp. 1–184, May, 1841. The wrapper has no printing on it, but I have taken the date from *Silliman's Journal*, xli. (1841), p. 275.
Part 2, pp. 185–392, April, 1842.
Part 3, pp. 393–504, February, 1843.
No more issued.

The case of Hooker & Arnott [Botany Beechey] is not so easy, for I have not succeeded in finding any copy with the original wrappers, and the following dates can only be taken as probable. If any reader of the *Journal of Botany* has access to such a copy, and would communicate to me the actual printed dates, I should be extremely obliged.

There is no difficulty in ascertaining the date of the first part, as several announcements concur; thus in *Linnæa* the issue is given as containing pp. 1-48, with ten plates, and came out in 1830. As I have failed to find more than occasional allusions during the progress of the work, I have pieced together all such indications, and assuming that each part was of the same dimensions as the first, I have referred to Pfeiffer's *Nomenclator* for the dates of all new genera as below, as the dates therein given must have been gathered from some copy:

Part 1, pp. 1–48, in 1830 (as above).
Part 2, pp. 49–96, in 1832 (*Pterochilus*).
Part 3, pp. 97–144, in 1832 (*Adenostoma*).
Part 4, pp. 145–192, in 1833 (*Layia;* see also Torr. & Gray, ii., 392, in confirmation).
Part 5, pp. 193–240, in 1836 (*Anisopappus*).
Part 6, pp. 241–288 (no indication of date, owing to the absence of any new genus).

Part 7, pp. 289–336 in 1840 (*Heterocentron*, etc., and several cited by Endlicher in that year).

Part 8, pp. 337–384, in 1840 (*Atamia*, etc.)

Part 9, pp. 385–432, in 1841? (*Grayia*, etc., cited by Endlicher in 1842).

Part 10, pp. 433–(486), in 1841 (*Sinclairia*).

The latter half of the work is especially open to doubt, for *Silliman's Journal*, xxxix. (1840), pp. 172–3, states that parts 9, 11, and 12 came out in 1839 or 1840, the twelfth being the conclusion; and, if correct, this shows that the latter parts were not of the same dimensions as the first part. It is in this direction that I seek for further information from any Botanist or Librarian who can enlighten me."—B. DAYDON JACKSON, in *Journal of Botany*, Oct., 1893.

The following extracts from Silliman's Journal show the approximate dates of the concluding parts of Botany Beechey and the Flora Boreali-Americana. It must be remembered, however, that communication at that time was not so frequent and so rapid between Europe and America as at present, and that we have no means of knowing how long the papers were in the hands of the editors.

Hooker and Arnott, the Botany of Capt. Beechey's Voyage, etc., Part ix., 1840. (London).—This work has extended to four hundred and thirty-two quarto pages, and another fasciculus will perhaps complete the work, but of this we are uncertain. The number of plates already cited is ninety-nine, of which eighty-nine are published. * * * —*Silliman's Journal*, xxxix, No. 1, 172–3, April–June, 1840.

Hooker and Arnott's Botany of Capt. Beechey's Voyage; part 10, 1841 (tab. 90–99).—The tenth and last fasciculus of this work concludes the account of a collection on the Pacific coast of Mexico, and is terminated by a complete index. The ten plates it comprises are nearly all devoted to Californian plants described in prior fasciculi; among which *Pterostegia*, a curious Polygonaceous genus, *Anemopsis Californica* of Nuttall, and *Lophochlæna* of Nees, a singular grass, are the most remarkable.—*Silliman's Journal*, xli, 374, July–Sept., 1841.

Hooker, Flora Boreali-Americani, or the Botany of the Northern parts of British America, etc., part xi., 1839. (London).—The eleventh part of this work has just reached us; and as the twelfth and concluding portion may soon be expected, we hope to give in the following number of this Journal a more particular notice of Sir William Hooker's most important and extensive labors in North American botany. For the present we may merely state that the eleventh fasciculus comprises the Orchideous, and the Irideous and Cyperaceous plants, and a portion of the grasses. * * * —*Silliman's Journal*, xxxix, No.1, 172, April–June, 1840.

Hooker's Flora Boreali-Americana, or the Botany of the Northern parts of British America, 2 vols. 4to. 182–940.—The twelfth part, which contains the

remainder of the grasses, the ferns, and the small orders allied to the latter, brings this important work to a conclusion within the limits prescribed. * * * This fasciculus contains twenty plates (making the whole number 238). * * * —*Silliman's Journal*, xl, 173, Oct.–Dec., 1840.

THE LAST LETTER OF DR. GRAY.

SUNDAY EVENING, November 27, 1887.

DEAR DR. BRITTON—I wish to call your attention either in a personal way or in the "Bulletin," if preferred, to a name coined by you on the 223d page of this year's "Bulletin."

"Conioselinum bipinnatum (Walter, Fl. Car. under Apium), Britton. Selinum Canadense, Michx., 1830."

I want to liberate my mind by insisting that the process adopted violates the rules of nomenclature by giving a superfluous name to a plant, and also that in all reasonable probability your name is an incorrect one.

Take the second point first: On glancing at the "Flora of North America," of Torrey and Gray 1, 619, where the name Conioselinum Canadense legitimately came in, you will notice that the name Apium bipinnatum, Walt. is not cited as a synonym; also that the synonymous name of Cnidium Canadense, Spreng., is cited with "excl. Syn." This Apium bipinnatum, Walt., you might gather was one referred to. Sufficient reason for the exclusion by Dr. Torrey might have been that Michaux's plant was a cold northern one, which nobody would expect in or near Walter's ground—the low and low-middle part of Carolinia. Besides, the preface of that Flora states that Walter's herbarium had meanwhile been inspected by Dr. Torrey's colleague, who may now add that the Apium bipinnatum is not there. So that the name you adopt rests wholly upon a mere guess of Sprengels, copied by De Candolle, dropped on good grounds by Torrey, but inadvertently reproduced in Watson's "Index," copying De Candolle. I suppose you would not contend that a wholly unauthenticated and dubious (I might say, doubtless mistaken) name, under a wrong genus, should supersede by its specific half a well-authenticated and legitimate name. And I am sure that you will not take it amiss when I say that very long experience has made it clear to me that this business of determining rightful names is not so simple and mechanical as to younger botanists it seems to be, but is very full of pitfalls. I trust it is no personal feeling which suggests the advice that it is better to leave such rectifications for monographs and comprehensive works, or at least to make quite sure of the ground.

We look to you and to such as yourself, placed at well-furnished botanical centres, to do your share of conscientious work, and to support right doctrines. So I may proceed to say that, upon the recognized principles since the adoption of the Candollian code, your name of Conioselinum bipinnatum, even if founded in fact, would be inadmissible and superfluous.

February 21, 1894.

By a corollary of the rule that priority of publication fixes the name, taken along with the fact a plant-name is of two parts, generic and specific, it follows that in any case Conioselinum Canadense is the prior name for those who hold to the genus Conioselinum. I have laid down what I take to be the correct view as to this, in my "Structural Botany," paragraph 794, where it is supported by the high authority of Bentham. I believe it is more and more acceded to by the most competent judges. There are those who make transpositions of divorced halves of plants' names, and who also make the law of priority mechanically override other equally valid laws without regard to sense. To such the old law maxim of the elder De Candolle was applied—*summum jus, summa injuria.* If you like to adopt their ideas, you have at hand a still older, the very oldest, name, namely Conioselinum Chinense, for I can certify that the plant we are concerned with is Athamantha Chinensis of Linnaeus. Very truly yours,

ASA GRAY.

The following comments from the Journal of Botany (London), may be of interest.

["In this Journal for 1892, pp. 254, 318, reference was made to a letter—the last written by Asa Gray—which, owing to circumstances not very clearly related, had never been published. The volume of the *Letters of Asa Gray*, just issued by Messrs. Macmillan, contains the document in full, and we here reproduce it.

"The circumstances connected with its writing and subsequent non-publication require to be stated: That Asa Gray was willing it should be published, the letter itself makes clear; that he considered it important is plain from the passage in the *Letters* which introduces it: 'On Sunday [Nov. 27] his pulse and temperature had improved so much that he was allowed to get up and go down-stairs at noon, the doctor congratulating him on the success of the treatment. There seemed a weakness of the right hand, which, however, passed away, and he wrote that evening the letter to Dr. Britton, which follows, and when remonstrated with for making the exertion said 'it was important, and must be written.' He died on the 2d of the following February.'

"Mankind has always attached a special interest to the last utterances of great men, and it might have been supposed that Dr. Britton would have hastened to avail himself of the permission expressly given by the writer to publish in his *Bulletin* the last contribution ever made by Asa Gray to the literature which he had enriched for so many years. So far, however, was this from being the case that it was not until Gray's fellow-worker himself lay on his death-bed that any knowledge of its existence was made public. Sereno Watson, in his last illness, dictated for the *Botanical Gazette* some remarks 'On Nomenclature,' which appeared in that journal for June, 1892, and which contain the following passage: 'I must express surprise that Dr. Britton has not considered it his duty to publish the last written words of Dr. Gray which were addressed to him upon this subject, and which

expressed his positive opinions upon this point.' We called attention to this in our Journal (1892, 254) in these words: 'When, in the exercise of our editorial discretion, we withheld from publication a subsequently printed note by Dr. Britton on this subject, he did not scruple to say [and to publish] that this was because we were "apparently afraid of the argument therein contained." We shall await with interest Dr. Britton's statement of the reasons which have induced him to suppress the last utterances of America's greatest systematist.'

"Dr. Britton's explanation appears in the *Botanical Gazette* for August, 1892, p. 254. He speaks of the letter as 'personal,' and, having admitted the accuracy of Dr. Gray's correction as to nomenclature, proceeds: 'The letter did not come to me as editor of the *Bulletin* of the Torrey Botanical Club, for I was not then editing that journal. I did not realize that it was intended for publication, and do not think that it was.' Moreover, having sent the letter to Cambridge, in accordance with a request, and having accepted a copy in exchange, he 'certainly never had any right to publish it after it had passed from [his] possession.'

"Commenting on the above, we said (*Journ. Bot.*, 1892, 318): 'These reasons may or may not be considered satisfactory, but we think that all botanists will regret that Dr. Gray's last utterances on a subject in which he is known to have taken a special interest were not made public.' These utterances are now before botanists, who must form their own conclusions as to the motives which have hitherto prevented their publication.—Ed. Journ. Bot.]"

SYSTEMATIC BOTANY.

BY MARCUS E. JONES.

To my mind the proper definition of the Systematic Botany, of the day and for the most part, is The Study of dried Plants in a few isolated localities remote from the Home of the Plants. This kind of scientific work is systematic and botanical, but it is not within gunshot of Systematic Botany. To claim that it is the real thing requires as much assumption as when the zoologists arrogate to themselves the term biology or natural history.

For a long time it has been the custom of western botanists to provide themselves with the necessary literature and then study their home plants, naming such plants as accord with the descriptions given, the rest they send with such notes as they consider valuable to certain persons in the East who have been regarded as authorities. The authorities compare them with the types of species or with their notions of the types, and if

the plants do not vary too much from the species are considered the same and so named; if they deviate too much, then they are erected into new species, usually on the strength of a single specimen. The authorities put down what they consider specific characters and omit all mention of what does not strike their fancy as specific. Believing that brevity is the soul of this branch of Systematic Botany they write a few words, only a line or two if possible, and call it a concise description. The notes of the field botanist they usually have dismissed (till very recently) with a remark like this: "Flowers said to be white, but they appear to be yellow." If the field botanist has been so bold as to write out a full description of the real characters, the closet botanist will cut out all except those which strike his fancy and are found in the specimen before him, and will add such as he thinks have been overlooked by the field botanist. At last when the description is published the weary field botanist goes out into the home of the plants, where perhaps there are acres of them, and he finds that his description does not describe and is only an aggregation of meaningless words. If he becomes disgusted and writes back as I did once, complaining, he may get the reply which I received from one of the three great botanists who have recently passed away, saying: "I suppose that by this time you have learned that it is impossible to grow plants to fit the descriptions." It struck me that it was about time to grow the descriptions to fit the plants. Of late this kind of thing has become a nuisance, and field botanists have taken to describing their own species. For a time certain drastic measures were employed to prevent it, but these having failed, the botanists are now appealed to not to publish till they have seen the allied types in the East, a thing which every western botanist agrees to most emphatically if by any means he can see the types, which is not often, for with his field knowledge he could tell quickly what are valid, distinguishing characters in his proposed new species, while from the descriptions of old types alone no man could do more than guess what the real characters are in hundreds of species.

The occasional republication of an old species by a western man is pointed to as "an exasperating blunder," as "maddening," but, dear me, that does not begin to express our feelings

when we see a new monograph from men who would not know their own new species if they saw them alive, and we find them bristling with botanical sports as new species, sports which field study would have avoided. A certain genus recently monographed I tried to use and found that I had to open a seed vessel on every plant that grew in a certain patch and all manifestly from the same seed; out of the patch I had to make about three species. Some years ago I had the same laughable experience in patches of Bæria in California, also in patches of Layia; and two years ago I had the same experience with Townsendia, out of which I had to make two species from the same seed, and had a quantity of nondescript material left still waiting to be christened. There are dozens of genera that are as badly tangled as these.

I think this confusion has arisen primarily from the absence of field study on the part of the author of the species, and secondarily from carelessness in describing species, coupled with a false theory that paucity of words is conciseness. The most concise botanist of the last generation was the one who used the most words in describing his species, and the most verbose were the ones who seemed to delight in what they called "short and concise" descriptions, which have proved to be only epitaphs of unknown species buried in their herbaria, and which we western men now and then duplicate from no fault of ours. In the first place, few of us can afford to go East to find out what these species are like, and in the second place, we are not responsible for the sins of our botanical fathers and grandfathers who have caused this state of things. That we have kept up with the literature of the day and have used every means in our power to avoid mistakes goes without saying, and some of us have even gone East to study types, but it is a hardship that should not be required of us. Let the closet botanist first describe his own species so that they can be recognized by the descriptions alone before he attempts to make new ones for the field botanist, else he will cause to become a conviction what is now arising as a suspicion that imperfect descriptions are not due wholly to ignorance. If it is not possible to get accurate descriptions of western species made by closet botanists, then eastern botan-

ists who make new western species should be required to deposit types in some central place in the West where they can be examined.

There are four well marked fields in Systematic Botany in this country at present. The first is closet monographing which is all the rage, and which so far has had one fundamental defect, the lack of accurate descriptions of the actual types of the species enumerated. In place of this we are given what the author considers to be the real species as it exists in nature which may vary much from the actual type as it is found in the type specimens. This is well enough as far as it goes, and would be all sufficient if the flora were fully known, but it is not known in the West, and as a rule the monographer himself would hardly recognize his own species if he were to see them in the field, for as a rule field study is a minus quantity with him. A person might as well try to become an expert in geology without ever going out of doors as to become an authority on species by studying dried weeds. The second field is real field work occupied in the West by an increasing number of good botanists. The third field is tinkering with nomenclature, in which there are many of every shade of opinion, but all bent on getting some castiron rule in the name of botanical justice which will be just to all and injurious to none, but which when adopted will be unjust to nearly everybody, will elevate to notoriety by-gone botanists whose descriptions were for the most part a botanical farce, and will attach the names of some present botanists to hosts of species which they never saw, and to hosts of others that were created before they were born, and nearly all of which species were recognized and placed in their proper places in the vegetable kingdom by others alone. The fourth field is the accurate description of known species; this is practically unoccupied. If a score of our keenest eastern botanists would partition out among themselves the species of plants whose types are in this country and accurately and minutely describe them just as they are, arranging the species in such a way as not to duplicate parts common to several (by the use of keys), they would earn the everlasting gratitude of all botanists, cover themselves with honor, and give to our branch of science a standing for thorough-

ness which it now sadly lacks, and an impetus which would result in the speedy settlement of the classification of our flora.

The most crying need of to-day is a rule that no species shall be considered as published if it has a string of words attached to it which do not describe the species so that it can be recognized without the use of the type specimen. It is true that this would invalidate the names of almost half of our flora if it were made an *ex post facto* rule, but we need not do that; we can forgive the good old men who have passed away, but we should expect better things of the living. Among the faults in describing species there is no one more common than sawing the air with descriptions. Take *Astragalus* for example, allied species, one is described as "matted, pod inflated, flowers white, calyx long, stipules connate, leaflets 10–15 pairs." Another is described as "stems many; pod hoary, 2-celled, pointed; flowers large, keel blunt; calyx hyaline with teeth as long as tube; stipules lanceolate and acute; leaflets glabrous, obovate, acute." The person who makes such a description which would apply equally to either species thinks he has described his plant, when in fact it is only an aggregation of words with no meaning. If a person does the best he knows how he is then liable to miss some things of importance, but when he starts out to give a "short and concise" description and throws in a pinch of words and calls it a description, he feels aggrieved if he is called to account, and tries to insinuate that his critic has some personal motive for his "unjust attack!" When all the species are known it is perfectly right to omit all things of no importance, but when they are not all known and their importance misunderstood there is no botanist either with inherited or acquired acumen who can tell what are essential and what non-essential characters, and it is pure pedantry to assume it.

Another innovation in nomenclature which I think should not be overlooked is the crediting of species to men who were not their authors. I do not know who first promulgated it, but it is in the line so much cultivated of late, of ignoring and underestimating the work of field botanists. One would think the way things are going that the only persons who have any rights are the people who sit in their warm and cozy herbaria and manu-

facture species which other men have sent them at great expense of health, time and money. The hardships of field collectors are very great and so far as I know not a single man has made anything more out of it than a poor living to say nothing of profit, and when such a man names a species after having studied it in the field and then sends it on to some authority in the East with its name, and in order not to have a rupture with that authority lets him publish it for him, it is an outrage to rob the field botanist because he did not actually pay for the printing or write the words attached to it. If we are to go behind the printing as some would have us do and attach not the name of the real author of the species but the one who ostensibly published it, then another question would arise as to whether the words credited to the man who published the species were actually written by him or some clerk in his office, in that case the clerk should have the honor of the name. But what will be the result of such an innovation? Douglas' species will all be taken from him, Nuttall's are in the same condition, though they are put in quotation marks he never published them, but Torrey and Gray did. It seems to me that these notions of nomenclature are becoming more and more technical and equally unjust and will not be accepted by the majority of botanists who want to see due credit given to those who have earned it by their labor. We are losing the meat of nomenclature in the rubbish of formalism. No *ex parte* rules adopted by a few botanists will ever secure uniformity in American botany, nor will any rules stand long which ignore the rights of collectors.

NOTES FROM THE GRAY HERBARIUM.

BY M. L. FERNALD.

HABENARIA LUCÆCAPENSIS, n. sp. A foot and a half high, leafy; principal root tuber-like, an inch long, with numerous accessory fibres from the summit: leaves thin, broadly elliptical, obtusish, four inches long, half as broad, rather abruptly narrowed to a sheathing base; the lowest smaller, orbicular; the upper reduced to lanceolate acuminate bracts, an inch in length: raceme

six inches long, 8–10 flowered: upper sepal ovate-orbicular, cucullate, about three lines in length; the lateral ones ovate-elliptic, obtusish, four lines long: petals deeply two-parted, upper segment linear, falcate, obtuse, dilated at the base, ascending, nearly equalling the sepals; lower segment filiform, about an inch in length; labellum three-parted to the base; the outer segments about fifteen lines long; the middle one linear, obtuse, a third to a half as long; spur clavate, free, 14–17 lines in length: ovary angled and obsoletely winged, about equaling the bracts; the two appendages of the stigma deeply bifid; the segments linear, spreading laterally, and curved ascending, retuse.——Collected on mountains of the Cape Region of Lower California, by T. S. Brandegee, September 16, 1893.

A stout species resembling in habit *H. Michauxii* Nutt., of the Southern States, but differing in its broader leaves, longer segments of petal and lip, and shorter more clavate spur.

ALLIUM ACUMINATUM Hook. var. CUSPIDATUM n. var. Scape more slender than in the type: perianth segments *oblong*, *abruptly cuspidate*, about the length of the stamens: bulb-coats more finely and less distinctly reticulated.——Collected at Wawawai, Washington, June, 1892, by Mr. W. R. Hull (No. 619).

Professor Porter's No. 74, from Weber River Valley, Utah, seems to be a form near this, but with the perianth segments tapering more gradually to the point, and with the stamens mostly short as in the type.

TRIFOLIUM GRACILENTUM Torr. & Gray, var. INCONSPICUUM, n. var. Much smaller than the type, slender, 2–6 inches high: leaflets 3–4 lines long, on petioles ½–1½ inches long: heads 3 lines high; corolla shorter than or barely equaling the calyx.——, Roadside, San Bernardino, Cal., Parish No. 2647.

Forms of the type approach this in habit, but the corolla is conspicuously longer than the calyx, as Orcutt's No. 1004 from Tia Juana, Lower California, and Palmer's No. 583 from Wickenberg, Arizona.

PHYLLOSPADIX, ITS SYSTEMATIC CHARACTERS AND DISTRIBUTION.

BY WILLIAM RUSSEL DUDLEY.

The genus Phyllospadix, Hook., was founded on plants collected by Dr. Scouler, at Dundas Id., Columbia River, and was published in Hooker's Flora Boreali Americana, vol. ii, p. 171, London, 1838. These plants were pistillate specimens of *Phyllospadix Scouleri*, W. J. Hooker, although the author makes no mention of the diœcious character of the genus and perhaps was unaware of it, as he observes that the genus "is separated from Zostera by the single style, capitate stigma, and curious leafy border of the spadix." Not only does he make no mention of anthers but in his figures (tab. 186) are shown an ovoid ovary, the "single style and stigma," the pistils in a single row, and the retinacula forming the "leafy border of the spadix" spreading if not recurved. The spadices and pistils of his specimens must have been imperfect, for his correct figure of the plant itself enables us to know the particular form of Phyllospadix he was dealing with, and in all the specimens of this form collected along the Pacific Coast and examined by ourselves, as well as in the still more numerous specimens of *Phyllospadix Torreyi*, Wats., we find a cordate sagittate ovary, with two laminated stigmas, two rows of pistils, and the retinacula of the pistillate spadix never reflexed or spreading.

Since its first publication a diagnosis of the genus has naturally appeared in other works, among them the following general systematic treatises:

Watson, *Geol. Survey of Cal.*, *Botany*, ii, p. 192, 1880. Bentham and Hooker, *Genera Plantarum*, iii, p. 1017, 1883. Engler and Prantl, *Die Natuerlichen Pflanzenfamilien*, ii. (1) p. 204, 1889.

Some of the omissions have been supplied—the most important being the diœcious character of the flowers,—and some of the errors have been corrected, but not all. As an example, figure B. (after Ruprecht) in Engler and Prantl ii, p. 204, is similar to Hooker's original figure of the spadix and ovaries, excepting that the two stigmas are shown. Fig. A. (also after Ruprecht) is not so good as Hooker's, not resembling the plant

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as it appears in the water. The original figure opposite, on p. 205, purports to be of *P. Scouleri*, but is a drawing of the form known as *P. Torreyi*, made from an herbarium specimen evidently. The drawing of the roots, root-stock, leaf-sheaths, ovaries, as well as the extraordinary number of fruiting nodes are all uncharacteristic. Prof. Ascherson's characterization of this genus and Zostera, in the text, is however thoughtful, and correct so far as the morphology of the genus was at that time ascertainable.

In making a critical biological study of the genus, its morphology and anatomy, during the past year, for the purpose of ascertaining its relationship to Zostera, and the possible causes, under the peculiar climatic conditions of this Coast, of its evolution as a genus, I came upon certain important structural characters which had remained undescribed, and was enabled to clear away some existing misapprehensions.*

In the light of this study it has seemed desirable to recast the generic description of Phyllospadix.

PHYLLOSPADIX, W. J. Hooker.

Submersed marine plants growing along exposed shores, from low-tide level to two fathoms below, with long, grass-like leaves, and creeping, much-branched rhizomas, which cling to rocks or to a rocky substratum in sand.

Rhizoma brittle, somewhat compressed from above, its greatest diameter from .5 to 1. centimeter, nodes not well-marked, the whole branching, extending indefinitely, and irregularly knotted when old.

Roots short (2–4 cm.) stout, simple, six, eight or rarely ten, in a double row on the side of each internode, alternating right and left, in successive internodes.

Branches are on the side of each internode, opposite the clusters of roots, and on alternate sides, in successive internodes; young branches very leafy.

Leaves, .5 to 2 meters long, slender, numerous, mostly arising from the terminal bud and from short sterile branches of the rhi-

*See *The Genus Phyllospadix*, by William Russel Dudley, in the Wilder Quarter-Century Book, Sept. 1893, pp. 403–420, two plates.

zoma, and concealing the ascending flowering branches. Leaf-sheaths long, open as in Gramineæ, but each nodal leaf-sheath completely investing the rhizoma and the distal terminal and lateral buds. All nodal sheaths on rhizoma and flowering branches rent by the expanding buds, leaving only the thicker portion to support the lamina. Laminæ, linear, emarginate at the apex, smooth, 3-nerved, furnished when very young with "fin-cells," along the margin. Ligule short of two auriculate appendages.

Flowering stems ascending as lateral branches from the rhizoma, slender, naked below. They are from one-third to two-thirds of a meter to the summit of the upper spathes, and are continued to the height of a meter or more by means of the leaves and leaf-like tips of the spathes. Flowers without perianth, diœcious, arranged in a double row, on a spadix which is sessile within the spathe, but short peduncled below. Pistillate spadices in the axils of the stem-leaves and five or six centimeters in length. Staminate plants infrequent, their spadices shorter. Spadix linear, flattened, somewhat channeled, provided along each margin with a row of oblong, obtuse, incurved, obliquely ascending, chartaceous appendages (retinacula), one for each ovary or pair of anther-cells, the whole closely invested when young by the membranous spathe. The acute apex of the spadix usually projects slightly beyond the spathe proper.

Ovary cordate-sagittate affixed near the base to the spadix and terminated above by a very short style, and two thin, acuminate, irregularly-lobed stigmas which are soon deciduous. The ovaries of each row ascend, point obliquely inwards, and alternate with a pair of rudimentary anther-cells, appearing when young like the monœcious spadix of Zostera. At anthesis the stigmas only project from the spathe. The spadix and ripened pistils free at maturity from the spathe, but its retinacula never spreading or reflexed. Ovule single, pendulous and orthotropous.

Each anther, a pair of oblong linear very distinct lobes pointing obliquely upward and inward along the face of staminate spadix, the apices of each row closely adjusted to those of the opposite row. Anthers maturing in acropetal order, the male retinacula at the same time successively and permanently recurv-

ing, leaving the anthers exposed, and finally shedding the entire spathe. Anther-lobes dehiscent longitudinally, the septum between the two loculi persistent and membranous. Pollens filamentous, one-half to one millimeter long, floating on the surface of the sea, when first escaping.

Fruits compressed, beaked above, sagittate lobed below, seed coats loose and membranous. Embryo compressed consisting largely of an orbicular hypocotyl, 2-lobed posteriorly. Cotyledon thin, oblong descending between the hypocotyl lobes.

Sclerenchyma tissue abundantly developed in the flowering stems and the leaves, wanting in the rhizoma.

The genus differs from Zostera in habitat, number, size, position, and character of roots and lateral branches, in the rhizoma, the presence of sclerenchyma in the upright stems and leaves, in the dicœcious spadices, in the rudimentary anthers on the pistillate spadix, in well-developed retinacula, form of ovary and hypocotyl, mode of dehiscence of anther, and the presence of a permanent membrane between the loculi of the anther-cells.

P. serrulatus Rupr., with "leaves toothed," from Alaska, may be at present dismissed as too little known, the description being based, it is said, on leaf-fragments only. Our California species approach too closely to one another; *P. Scouleri* being variable, while *P. Torreyi* is pretty constant in its characters; but from our present knowledge it would appear proper to retain them as species.

The following species are the only ones detected on the coast of California, and the only ones certainly known to exist:

P. SCOULERI, Hook., Flora Bor. Amer. ii, p. 171 (1838). Flowering stems not common, peduncles short, 1 to 6 cm. long. Pistillate spadix one; rarely two are present, one at each node. Ripened pistils larger than in the following species. Leaves flat and much thinner and lighter green, but with more sclerenchyma than in *P. Torreyi;* variable in width, 1½ to 2 mm. in mature plants, 3 or even 5 mm. on young sterile specimens; sterile plants abundant, growing on the rocks in the heaviest surf and on the most exposed ocean shores. Specimens examined from Tillamook Head, Or. (Henderson), from the mouth of the Rus-

sian River, Santa Cruz, Pacific Grove, and San Luis Obispo Bay, Cal. (Dudley). Reported from Vancouver (Macoun), Columbia River (Scouler), Santa Barbara (Mrs. Bingham).

P. TORREYI Wats., Proc. Amer. Acad. xiv, p. 303 (1879). Flowering stems abundant, elongated, usually 20–30 cm. to the lowest of the two to four fertile nodes. Pistillate spadices two to five at each node, a cluster terminating the stem, each 5 or 6 cm. in length. Staminate spadices shorter and shorter stalked, three to five at each node. Ripened ovaries 5 or 6 mm. long, and nearly as broad. Leaves numerous and .5 to 2 meters long, 1 to 2 mm. wide, coriaceous, and oval in transection, dark olive-green. Sclerenchyma less abundant than in *P. Scouleri*. Abundant on the ocean shores mixed with *P. Scouleri*, but inclining more to tide-pools and protected coves among the rocks, often seeming to grow in tussocks or turfs in the sand, but really arising from sand-covered stones. Specimens examined from the Russian River, Cal. (Dudley), Farallones Ids., and Santa Barbara (Cal. Acad. Coll.), San Diego (Cleveland), Ensenada, Lower California (Brandegee), and many from Santa Cruz, Pacific Grove, and San Luis Obispo Bay, Cal. I have no doubt it extends to Vancouver and beyond, also much further south than it has yet been reported.

LOWER CALIFORNIA GRASSES.

AN ENUMERATION OF THE GRASSES COLLECTED BY MR. T. S. BRANDEGEE IN LOWER CALIFORNIA IN 1893.

BY F. LAMSON-SCRIBNER.

I have not had time nor the facilities, even if I had desired, to fall into line with the nomenclaturists of the day in this enumeration, but I have studied the plants of the collection carefully, and so far as I have ventured to name them I believe they will be understood. I have been unable to consult the collections of Bourgeau, Botteri, Liebmann, and some others, and it is very likely that I have erred in some of my determinations. I have, however, done the best that the facilities at my command would permit.

February 26, 1894.

1. TRIPSACUM LANCEOLATUM Rupr. in Benth. Pl. Hartw. 247; Fourn. Mex. Pl. Enum. Gram. 68.—El Taste, September 13 (4).

2. HACKELOCHLOA GRANULARIS (L.) OK. *Cenchrus Granularis* L.; *Manisuris granularis* Sw.—El Taste, September 11 (20). Saucito, October 15 (68).

3. ANDROPOGON SACCHAROIDES Sw. Sessile or fertile spikelets 2½ lines long, awns 10–12 lines. I have exactly the same form from San Diego, collected by C. R. Orcutt.—El Taste, September 9 (47).

4. ANDROPOGON CONTORTUS L. *Heteropogon contortus* R. & S. El Taste, September 13 (2); Pescadero, September 23 (1).

5. ANDROPOGON IMBERBIS Hack. in *Flora* 1885, 119. A form with the pedicellate spikelet awned.—Saucito, October 15 (65).

6. ANDROPOGON HIRTIFLORUS HBK. var. FEENSIS Hack. *A. feensis* Fourn.—El Taste, September 13 (31).

7. ÆGOPOGON GEMINIFLORUS HBK. var. UNISETUS Fourn. *Æ. unisetus* R. & S.—La Chuparosa, October 17 (60).

7a. ————. Var. BREVIGLUMIS, n. var. Spikelets two in each cluster, one hermaphrodite, the second reduced to a pair of aristiform empty glumes and a linear, triaristate floral glume. The empty glumes of the perfect floret very short and narrow so that the glumes appear to be awn-like from the base, subequal and about the length of the triaristate flowering glume. This is unlike any other form which I have, the nearest approach to it being No. 247 E. Palmer (1886). The details of the spikelets in this genus vary so much that I hesitate to give this plant specific rank.—Saucito, October 14 (69).

8. NAZIA OCCIDENTALIS (Nees). *Tragus occidentalis* Nees. *Lappago aliena* Griseb.—El Taste, September 11 (36).

9. PASPALUM KARWINSKYI Fourn.? Allied to *P. paniculatum* L. Nodes, sheaths, and leaves smooth, racemes 10–16, 1½ inches long, approximate; spikelets ¾ lin. long quadriseriate, obtuse, smooth.—San José del Cabo, September 2 (15).

10. ERIOCHLOA PUNCTATA Hamilton. *Nelopus punctatus* Nees.—El Taste, September 15 (41).

11. PANICUM SANGUINALE L.—El Taste, September 9 (49); La Honda, October 22. Empty glumes densely pilose at the apex and along the margins (*P. fimbriatum* Kth.), (53).—San José del Cabo, September 2 (29).

12. PANICUM ———. Allied to *P. filiforme* L. Spikes 2–5, approximate, 2–3 inches long, outer glumes ciliate and fimbriate along the margins —El Taste, September 11 (42, 43).

13. PANICUM PASPALOIDES Pers.—El Taste, September 9 (13).

14. PANICUM VELUTINOSUM Nees. Agrost. Bras. 121, (*P. Petiverii* β. Trin. Icon. t. 180). Spikelets 1½–2 lines long, obovate, abruptly acuminate pointed, dark purple and pubescent towards the apex; fourth glume minutely mucronate pointed and transversely rugose; leaves narrowed at the base, not cordate.—Saltillo, September 17 (17).

15. PANICUM PETIVERII Trin.?=No. 159 and No. 208 E. Palmer 1887 (*P. dissitiflorum* Vasey, ined.). Spikelets 1½ lines long. Outer glumes shortly and sparsely pubescent, the first 3-nerved and ⅓ as long as the spikelet, the second and third glumes 5-nerved and together with the fourth abruptly short-pointed. The fourth glume punctate striate on the back (not transversely rugose). Leaves cordate clasping at the base where they are sparingly ciliate on the margins. Racemes distant, 2 inches long, remotely flowered, spikelets solitary or in pairs on short, pilose pedicels.—Pescadero, September 23 (27).

16. PANICUM AVENACEUM HBK. Nov. Gen. et Sp. i. 99.—El Taste, September 12 (21).

17. PANICUM DECOLORANS HBK.? Spikelets turgid, 1½–2 lines long. First glume hardly ½ as long as the spikelet, obtuse 5-nerved, the second and third glumes longer than the fourth, broadly lanceolate, subacuminate, 7–9 nerved, the third with a palea, fourth glume obtuse. Habit of *P. decolorans* as described by Kunth.—Saucito, October 14 (70).

18. PANICUM COMPACTUM Sw., Griseb. Flor. Br. W. Ind. 552.— Saltillo, September 16 (22).

19. PANICUM LATIFOLIUM L. Sp. Pl. ed. i., *P divaricatum*

HBK. and Am. auct.=No. 362 E. Palmer 1886.—El Taste, September 11 (23). San Felipe, September 9 (28).

20. PANICUM BREVIFOLIUM L.—El Taste, September 10 (24).

21. PANICUM COLONUM L.—San José del Cabo, September 1 (40).

22. PANICUM COLONUM—depauperate? Culms very slender 3–4 inches high; leaves narrow-linear; racemes reduced to 1–5 spikelets.—El Taste, September 11 (52).

23. OPLISMENUS BURMANNI (Retz) Beauv. *O Humboldtianus* Nees, not Presl.=No. 463 E. Palmer 1886.—Miraflores, October 13 (75).

24. SETARIA GLAUCA Beauv.—Saltillo, September 17 (32).

25. SETARIA VIRIDIS Beauv.? San José del Cabo, September 2 (46).

26. SETARIA————. Panicle branched interrupted below, caudate; bristles much exceeding the spikelets which are about 1 line long. First glume very small obtuse, 3–nerved; second glume 5–nerved, a little shorter than the flowering glume; third 7–nerved as long as the acute and transversely rugose flowering glume.=No. 191 E. Palmer 1887, also No. 957 E. Palmer 1878. —San Felipe, September 9 (45). To be compared with *S. unisetas* Fourn.

27. SETARIA SETOSA Beauv.? Spikelets 1¼ lines long, first glume acute, 3–nerved, ½ as long as the spikelet, second glume ⅓ shorter than the fourth 7–nerved; flowering glume transversely rugose and mucronate pointed.—Pescadero, September 20 (48).

28. CENCHRUS ECHINATUS L.—Mazatlan, Mexico, October 8 (79).

29. CENCHRUS PALMERI Vasey! Proc. Calif. Acad. Sci. Ser. 2, vol. ii. p. 211; grasses of the Pac. Slope t. 3.=No. 689 E. Palmer 1887, collected at Los Angeles Bay, Southern Calif. This is possibly *Cenchrus pauciflorus* Benth. Bot. Sulph. 56. Bentham's plant which was from the Bay of Magdalena is thus characterized: "Culmis suberecto, foliis glabris vix scabriusculis, involucris alternis, distantibus, pilosiusculis sub 10–fidis, spiculis subternas superantibus."—La Mesa, October 24 (12).

30. ARISTIDA BROMOIDES HBK. Empty glumes unequal, the first 2–3 lines long, acute, the second 3½–4 lines, acute or obtuse, both 1-nerved. Floret about the length of the second glume. Awns subequal, 2½–5 lines long, lateral awns slightly divergent. Callus densely barbate. Culms slender, branched, 6–12 inches high, with a narrow strict panicle 2–5 inches long. —Saucito, October 15 (66).

31. ARISTIDA SCHIEDEANA Trin. First empty glume lanceolate, acute, 3½–4½ lines long, strongly aculeolate scabrous on the keel for the entire length; second glume a little longer than the first, 1-nerved, obtuse or shortly bifid at apex, the smooth midnerve projecting as a short mucro between the lobes; flowering glume with a slender and acute barbate callus nearly ½ line long, the glume 6–7 lines long, with an awn 2 lines long, the lateral awns minute. Panicle 6–10 inches long, branches 2–4 inches, solitary or in pairs, rather rigid, widely spreading, with appressed spikelets above the middle, naked below. Culms 1–2 feet high, rather slender.—Saucito, October 15 (64).

32. ARISTIDA CALIFORNICA Thurber.—San José del Cabo., September 12 (38).

32a. ARISTIDA SCABRA Kunth, *Streptachne scabra* HBK. *Ortachne scabra* Fourn.—El Taste, September 11 (26).

33. ORYZOPSIS FIMBRIATA Hemsl. *Stipa fimbriata* HBK. Empty glumes about 2½ lines long, equaling or slightly exceeding the obovate obtuse and pilose flowering glume, shortly mucronate pointed. Awn of the flowering glume about 7½ lines long, once or twice geniculate, strongly twisted below, scabrous. Callus very short, acute, barbate. First glume 5-nerved, the second 3-nerved. Radical leaves involute filiform, about a foot long, shorter than the culm.—La Chuparosa, October 17 (72).

34. MUHLENBERGIA LAXIFLORA Scribn.=No. 1412 C. G. Pringle (1887). Empty glumes about ½ line long, subequal, obtuse; flowering glume 2 lines long narrow-lanceolate, 3-nerved, 2-toothed at the obtuse apex awned; awn 1–2 lines long. Callus barbate. Culms 2–3 feet high, simple, panicle narrow, elongated, dark purple. Perennial from a stout root-stock.—La Chuparosa, October 17 (74).

35. MUHLENBERGIA DISTICHOPHYLLA Kth.—El Taste, September 13 (33, 34).

36. MUHLENBERGIA CILIATA Kth.=No. 1435 Pringle (1887) La Chuparosa, October 21 (59).

37. MUHLENBERGIA ———. Near *M. stipoides.* Annual culms cæspitose, branched, slender, with usually 7 nodes; leaves flat, spreading, 2–3 inches long, ½ line wide, sheaths shorter than the internodes. Panicle 4–5 inches long strict, base enclosed within the uppermost sheath. Spikelets 2 lines long with a slender awn 6–8 lines long; empty glumes short (about ½ line) subequal obtuse; flowering glume scabrous on the back, pilose on the margins below, apex minutely 2-toothed, awn from between the teeth; callus short, minutely barbate.—La Chuparosa, October 17 (71).

38. MUHLENBERGIA ———. Culms taller and more branched than in the last (No. 71) and awns longer, 8–18 lines, otherwise the same.—Saucito, October 15 (62).

39. LYCURUS PHALAROIDES HBK.—Sierra de la Laguna, October 19 (77, 81).

40. PEREILEMA CRINITUM Presl.—La Chuparosa, October 18 (63).

41. SPOROBOLUS MINUTIFLORUS Link.? Scribner in Proc. Acad Nat. Sci. Phila. (1891) p. 299.=No. 3130 Pringle (1890) —La Chuparosa, October 17 (80).

42. SPOROBOLUS RACEMOSUS Vasey.= No. 4B, E. Palmer 1885 (in herb. mihi) and 1425 Pringle 1887.—La Chuparosa October 21 (58). Mixed with this are specimens of *Sporobolus annuus* Vasey and *Muhlenbergia ciliata.*

43. SPOROBOLUS DOMINGENSIS Kth.=No. 165 E. Palmer 1887.—San José del Cabo, September 2 (7).

44. SPOROBOLUS VIRGINICUS Kth.=No. 338 E. Palmer 1887. —Guaymas, Mexico (7).

45. SPOROBOLUS EXPANSUS Scribn. Culm stout 4–6 feet high; sheaths smooth, striate; ligule a short and densely ciliate line; lamina narrow, elongated filiform, smooth on the back, pilose above near the base and serrulate-scabrous along the margins;

panicle 1–2 feet long caudate, branches slender, erect, spreading, the lower 6 inches long, rather densely flowered; spikelets subracemose along the branches, nearly 1 line long; empty glumes unequal, the first about ½ the length of the second which nearly equals the flowering glume; flowering glume smooth barely acute, awnless, callus naked.

This grass is closely allied to *Sporobolus Wrightii* Scribn. (in Torr. Bull. ix, 103) but is apparently even more robust, panicle more elongated, branches and pedicels more slender and *scabrous* and spikelets smaller. It is possibly *Epicampes expansa* Fourn. but it certainly is as good a Sporobolus as *S. Wrightii.* Fournier enumerates twelve Mexican species of Epicampes but his descriptions are so short or incomplete that it is very difficult to make positive determinations.—Pescadero, September 23 (16).

46. DESCHAMPSIA PRINGLEI Scribn. Proc. Acad. Phila. (1891) p. 300=No. 1429 Pringle 1887.—La Chuparosa, (55).

47. MICROCHLOA SETACEA R. Br.—El Taste, September 11 (5).

48. CHLORIS ELEGANS HBK.—San José del Cabo, September 2 (6).

49. LEPTOCHLOA MUCRONATA, Kunth.—San José del Cabo, September 2 (18).

50. LEPTOCHLOA VIRGATA Beauv. var. MUTICA Fourn. Pl. Mex. Enum. Gram. 146. *Diplachne verticillata* Nees & Mey. *Diplachne imbricata*, Thurb.—No. 47, E. Palmer (1887) and No. 331 (1886).—San José Del Cabo, September 2 (8).

51. BOUTELOUA ARISTIDOIDES, Thurb. *Dinebra aristidoides* HBK.—Pescadero, September 23 (51).

52. BOUTELOUA CURTIPENDULA Gray. *Chloris curtipendula* Michx. *Bouteloua racemosa* Lag.—El Taste September 11 (3).

53. BOUTELOUA AMERICANA Scribn. Proc. Acad. Nat. Sci. Phila. (1891) 306. *Bouteloua bromoides* Lag. *Bouteloua Humboldtiana* Griseb.—La Honda October 21 (59). The details of the spikelets in this specimen agree with the figure of *Dinebra bromoides* HBK. Nov. Gen. t. 51.—El Taste, September 11 (25). In this the characters of the spikelets are those of *Dinebra*

repens HBK. as figured in Nov. Gen. Pl. t. 52. These species (*Dinebra bromoides*, *D. repens* and *Bouteloua Humboldtiana*) were united under *Bouteloua bromoides* Lag. by S. Watson in Proc. Amer. Acad. 1883, p. 177. *Aristida Americana* Sw., Obs. 41, t. ii, f. 2 (1791), cited by Kunth, is an older synonym, the specific name of which is taken up.

54. BOUTELOUA HIRSUTA Lag.—El Taste, September 12 (19).

55. BOUTELOUA POLYSTACHYA Torr.—San José del Cabo, September 2 (39).

56. PAPPOPHORUM MUCRONULATUM Nees. ?=No. 350 E. Palmer (1887). This may be only a form of *P. alopecuroideum* Vahl., but it differs from my West Indian specimens so ticketed, and it does agree very well with Doell's figure and description of *P. mucronulatum*. It is not *P. apertum* Munro, Scribn. in Bull. Torr. Club, ix (1882) p. 52. The following are some of the characters of the spikelets: Spikelets including the awns 11–12 mm. long, with usually two perfect flowers and two to three empty glumes above. Lower empty glumes ovate lanceolate, bristle-awned between the two unequal teeth at the apex, the second about 5 mm. long, a little exceeding the first. Flowering glumes broad and rounded on the back, about 3 mm. long to base of awns, densely pilose on the short and obtuse callus and on the midnerve below the middle and on the sides half way up, pubescent on the inner face above, 7-nerved. Awns 12–15, the longer ones 8–9 mm. diverging, violet-colored, strongly scabrous. The upper empty glumes with a villous tuft on the back below the middle, sides and callus naked.—Guaymas Mexico, November 7 (76).

57. MONANTHOCHLOE LITTORALIS Engelm.—Pescadero, September 23. (Mixed with No. 35).

58. ERAGROSTIS PLUMOSA Link. *Poa tenella*. Kunth. Revis. Gram. ii. 467, t. 147, not Linn. *Eragrostis ciliaris* var. *patens* Chapm.—San José del Cabo, September 2 (9).

59. *Eragrostis major* Host.—El Taste, September 11 (37).

60. *Eragrostis lugens* Nees.—La Chuparosa, October 17 (78).

61. ERAGROSTIS NEO-MEXICANA Vasey. I have this from

New Mexico, collected by G. R. Vasey 1881.—El Taste, September 9 (14).

62. ERAGROSTIS ————. El Taste, September 9 (50).

63. ERAGROSTIS LIMBATA Fourn.? =234 E. Palmer 1886.—Saucito, October 15 (67).

64. ERAGROSTIS NIGRICANS Steud. (*Poa nigricans* HBK.). This is apparently a small form of this species.—Sierra de la Laguna, October 19 (82).

65. DISTICHLIS SPICATA (L.).—Pescadero, September 23 (35).

66. FESTUCA TENELLA Willd. ? This appears to me to be only a very delicate form of *Festuca tenella* Willd. Very likely it is the *Festuca muralis* Kth. var. *pumila* Fourn. Mex. Pl. Enum., Gram. 123, without description, reference being made to No. 554 Liebmann, collected at Cerro Leon.—La Chuparosa, October 17 (61).

67. BROMUS ————. Allied to *B. Kalmii.* The species of Bromus are exceeding variable, and their determination difficult. I have nothing which matches this, but doubtless it has been published. The slender culms are about 2 feet high, and minutely pubescent; sheaths downwardly pubescent; panicle small, the axis and branches pubescent. Empty glumes unequal, the first lanceolate, acute, 1-nerved, the second oblong, obtuse, and 3-nerved; flowering glume finely pubescent all over, obtusely bifid and short awned between the teeth.—La Chuparosa, October 17 (73).

68. BRACHYPODIUM MEXICANUM Link.—La Chuparosa, October 16 (54).

69. JOUVEA STRAMINEA Fourn.? Scribner in Bull. Torr. Bot. Club, xvii, p. 226; *Rachidospermum Mexicanum* Vasey, Bot. Gaz. xv, 110.—San José del Cabo, October 27 (10).

SYSTEMATIC BOTANY OF NORTH AMERICA.

UNDER THE EDITORSHIP OF

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Columbia College,
New York City.

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Lake Forest, Ill.

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Columbia College,
New York City.

LUCIEN M. UNDERWOOD,
De Pauw University, Greencastle, Ind.

COLUMBIA COLLEGE, NEW YORK, November —, 1893.

MY DEAR SIR:—

It is proposed to publish a comprehensive, descriptive Flora of the United States and British America in the general sequence of the larger groups adopted in "Die Naturliche Pflanzenfamilien" of Engler and Prantl, thus including all the known plants of this area. In order to accomplish this, the widest co-operation of American Botanists is desired, and I am authorized by the Board of Editors to invite your interest and assistance.

The work will be issued in parts averaging about 100 pages each in royal octavo or small quarto size. About 5 of these parts will constitute a volume, and it is estimated that about 75 parts, making 15 volumes, will be required. No illustration is contemplated, but copious references to published plates and figures will be made a feature. In addition to the technical characterizations, chapters dealing with the economic, palæontologic and horticultural aspects of each order will be appended. Especial attention will be given to the verification of original descriptions, to the examination of type specimens, to the citation of type localities, and to geographical distribution.

No attempt will be made to treat the groups consecutively, but the sequence of orders being tentatively established in advance, and the number of genera and species being approximately known, it is possible to print parts of all the volumes, or of as many of them as is desired at about the same time. It is hoped that five or six parts can be issued annually, beginning in 1896. Several parts are already in preparation.

The following botanists have consented to co-operate with the editors in preparing monographs of various groups, or in superintending their preparation:

Prof. Thos. C. Porter, Lafayette College, Easton, Penn.; Prof. Chas. E. Bessey, University of Nebraska, Lincoln, Neb.; Prof. Chas. R. Barnes, University of Wisconsin, Madison, Wis.; Prof. Wm. Trelease, Missouri Botanic Garden, St. Louis, Mo.; Prof. Conway Mac Millan, University of Minnesota, Minneapolis, Minn; Prof. J. A. Arthur, Purdue University, Lafayette, Ind.; Dr. Thomas Morong, Columbia College, New York City;

Prof. L. H. Bailey, Cornell University, Ithaca, New York; Prof. Lester F. Ward, U. S. National Museum, Washington, D. C.; Mr. O. F. Cook, Huntington, New York; Dr. William Wheelock, Columbia College, New York City.

Each monographer will be responsible for his own matter, the only restrictions placed on contributors being that they conform to a general style and to principles of nomenclature and citation, and that descriptions be extended only to an average limit of a certain number of words, this number to be hereafter determined. The treatment of these matters will be indicated by sample sheets, which will be submitted at an early date. It is expected that an approximately uniform consideration of species can be secured.

The editors believe that by prosecuting the work in the manner above indicated, it will be possible to produce a complete Systematic Botany of the country within fifteen years. They fully realize the impracticability of such a task being accomplished by a few students only, and earnestly desire the aid and support of all American Botanists. They request your co-operation, and ask that you serd a reply to this letter to the undersigned, and will welcome any suggestions that you may be pleased to make.

For the Board of Editors,

N. L. BRITTON,

Chairman.

The above circular was sent to a number of Botanists besides those mentioned in the text. While a "Flora of the United States and British Columbia" is highly desirable, a glance at the names of the proposed monographers gives evidence that if ever accomplished it will be a remarkably uneven work. The qualification for participants seems to be not capacity and attainments, but solely agreement with the peculiar nomenclatural predilections of the editors. As they, or some of them, are, however, already at loggerheads over details, the date of the completion of the work is likely to be still farther in the future than the estimated "fifteen years." K. B.

A NEW SPECIES OF BULIMULUS.

BY HENRY HEMPHILL.

EULIMELLA OCCIDENTALIS. Shell small, turriculated, white, shining, transparent, consisting of about nine rather flattish convex whorls, with a single fine, revolving, threadlike liræ

above the periphery, and with very fine microscopic revolving striæ beneath, observable only with a good glass and light; suture deep; aperture subquadrate; lip simple, acute; columella straight.

Length—4 mill.

Breadth—1 mill.

Habitat, San Diego, California.

Station, mudflats between tides.

I collected about twenty specimens of this interesting little shell some years ago, which seems undescribed, and I take this occasion to add it to our West Coast shells.

CHARIESSA LEMBERTI.

BY J. J. RIVERS.

CHARIESSA LEMBERTI nov. sp. Form robust, prothorax widest across the middle; head and prothorax finely punctate; Elytra twice as long as wide, but widening from base to near the apex; finely punctured in a faintly longitudinal pattern and covered with very short black hair. Color: Head, basal joints of antennæ, prothorax, legs, all but the tarsi, and the whole of the underparts red of a subdued crimson. Size: Variable in both sexes from 8–12 mm.

Has a superficial resemblance to *C. elegans* Horn, but is distinguished by having its thorax flatter and wider, by the legs being red instead of black (except the tarsi), by the basal joint of antennæ being red, and by its prothorax not bearing a polished surface, as in *C. elegans* Horn, and the insect is altogether a wider species. Habitat: Yosemite. Collected by Mr. J. B. Lembert, who kindly presented it to me.

March 12, 1894.

TWO UNDESCRIBED PLANTS FROM THE COAST RANGE.

BY T. S. BRANDEGEE.

EASTWOODIA nov. gen. (pl. xxx.*) Heads homogamous, discoid, many-flowered, all the flowers fertile. Involucre short-campanulate, bracts narrow, few-seriate. Receptacle hemisphaerical, papillate by the elevated points of attachment of the flowers and their embracing paleæ. Corolla yellow, tubular-funnelform, shortly five-cleft. Stamens exserted, obtuse or emarginate at base. Style-branches flattened, stigmatic lines marginal, not extending to the tip. Akenes turbinate, obscurely angled, crowned by 5–8 paleæ.

Named in honor of Miss Alice Eastwood, curator of the herbarium of the California Academy of Sciences.

E. ELEGANS. Suffrutescent, nearly glabrous perennial ½–1 m. high, branching; stems striate, bark whitish, shreddy in age: leaves alternate, sessile, fascicled in the lower axils, linear-oblanceolate, acuminate, 1-nerved, minutely and very sparsely scabrous, somewhat succulent, 2–4 cm. long, 2–4 mm. wide: heads 1½–2 cm. broad, 1–½ high, solitary or loosely cymose at the upper part of slender bracts, leafy shoots of the year, 2–2½ dm. long: involucre appressed; bracts corneous, whitish, 3–4-seriate, oblong-lanceolate, mucronate, the inner broader and with a scarious erose margin; bracts of the receptacle complicate, oblong, corneous, with scarious erose tip, caducous, densely glandular below the tip within as are also those of the involucre: corolla glabrous, 6 mm. long, somewhat leathery: stameus and style well exserted; style branches broad, rounded at summit, not appendaged, glabrous within nearly to the tip, hirsute on the upper half without, stigmatic lines narrow; akenes short-turbinate somewhat 3–4-angled, densely upwardly pubescent, about 2 mm. long, not contracted at the summit; pappus of 5–8 unequal, white, linear-lanceolate erose-margined, corneous, persistent paleæ, much longer than the akenes. Collected by Mr. L. Jared on the Cariso Plains; by Miss Eastwood, near Alcalde; by Mr. W. L.

* EXPLANATION OF PLATE. E. flowering branch; C. flower showing exserted stamens and style; D. bract of receptacle; B. stamens; style tips greatly magnified.

March 12, 1894.

Watts on the hills west of Bakersfield, and by the writer near the same time and in the same general region, April–June, 1893.

The affinities of this plant are with Asteroideæ, of which it has the style-tips and involucre with much the general habit of the desert species of Aplopappus, but it differs from any of the genera in its complicate-chaffy receptacle, and its pappus. The western rim of the San Joaquin Valley yet little explored may be expected to still yield many novelties.

LEPIDIUM JAREDI. Annual, branching, 1–2 dm. high, somewhat glaucous, upper part of stem and inflorescence pubescent, with spreading hairs: leaves lanceolate, entire, or toothed: flowering branches becoming elongated, often half the length of the plant: pedicels terete, slender, spreading, in fruit, 1 cm. long, and somewhat recurved; flowers bright yellow: sepals 2 mm. long: petals a third longer, with oval or obovate blade and narrow claw: stamens 6, nearly equal: fruit ovate, glabrous, reticulate, 3–4 mm. wide and hardly as long, acute or barely emarginate, at summit, not winged; style ½ mm. long; cotyledons incumbent.

Collected by Mr. L. Jared near Goodwin, San Luis Obispo County, April–May, 1893; and near Riverdale, Fresno County, about the same time by Mr. Alvah Eaton.

ADDITIONS TO THE FLORA OF THE CAPE REGION OF BAJA CALIFORNIA. II.

BY T. S. BRANDEGEE.

The following collection was made during the months of September and October in the western part of the mountains of the Cape Region.

The particular localities explored were either previously unexplored or had been visited at a different time of the year. The rainy season of the region is in the months of July, August, and September, but little rain fell about San José del Cabo, and consequently there were comparatively small collections made in its vicinity; and the same conditions prevailed over the region

March 12, 1894.

between the high mountains and the Gulf of California, but west of the mountains the ground was well soaked by frequent showers, and vegetation was luxuriant.

The numbers of the list are continuous with those of previous ones. All above 739 are additions to the known plants of the Cape Region. The smaller numbers belong to plants which occur in the previous lists, of which better specimens or fuller material require notice, or lead to rectifications of diagnosis.

The grasses of the collection have been studied by Prof. F. Lamson-Scribner, and are not incorporated here, and there yet remain a considerable number of species, requiring careful study, which for lack of time could not be made ready for this paper.

2. THALICTRUM VESICULOSUM Lec. var. PENINSULARE. Plants about 1 m. high, glabrous throughout, excepting a minute glandular pubescence on the margins of the sheaths, somewhat glaucous; stems striate: leaves tripinnate, distant; leaflets slender-petiolulate, thin, sometimes 3 cm., but ordinarily less than 2 cm. long, green above, glaucous below, spatulate, ovate or obovate, 3–6-, commonly, 3-lobed at apex, the lobes entire: panicle loose and spreading somewhat leafy; pedicels elongated, filiform: flowers usually hermaphrodite: sepals 4, 2 mm. long, oblong-elliptic or oval, purplish, with conspicuous parallel veins: filaments filiform, flexuous, more or less dilated towards the top, in full development exceeding the linear 4–5 mm. long, mucronate anthers, ovaries about 5, stipitate; style filiform 6–8 mm. long, strongly papillose on the back, tapering to the extremity, stigmatic nearly the whole length, the thin margin rolled in: heads nodding in fruit, akenes 5–6 mm. long, usually concave on the inner angle, stipitate, tipped by more or less of the base of the style, the flattened sides and back strongly veined and nodulose.—Common at middle elevations in the mountains of the Cape Region.

This plant is geographically so far removed from the South American type that comparison of specimens may show them to be specifically distinct.

3. RANUNCULUS ABORTIVUS L. var. AUSTRALIS. Lower leaves reniform, 3–5 cm. broad, 2–3 cm. long, petals 5–6 mm. long. Perennial, flowering in August. Abundant in wet places

on the high summits of Sierra de la Laguna and San Francisquito.

740. RANUNCULUS HYDROCHAROIDES Gray. Common in wet places and standing water, at La Chuparosa and Sierra de la Laguna, the immersed plants not in flower in October, those growing in wet banks just coming into bloom.

10. LEPIDIUM INTERMEDIUM Gray. Mature specimens now collected show that the cotyledons are incumbent, and this name should take the place of *L. Virginicum*. Some of the specimens have rather conspicuous petals like the New Mexico and Texas plants.

741. CLEOME MELANOCARPA Watson. The specimens differ from Dr. Palmer's Chihuahua plant in having slightly narrower pods. The petals are white, but the plant does not belong to the § *Physostemon*. It is common in September on the Pacific slope of the mountains.

742. IONIDIUM PARIETARIÆFOLIUM DC. (?) The same plant as Dr. Palmer's No. 93, 1885, from Chihuahua, Proc. Am. Acad. xxi, 415.—Common in the elevated region west of Sierra San Lazaro.

743. ALSODEIA PARVIFOLIA Wats (?)—Mountains east of Pescadero, September 16, 1893.

744. POLYGALA GLOCHIDIATA HBK. Cañon Hondo. Seen in but one locality.

36. PARONYCHIA MONANDRA Brandg. This grows abundantly about the Sierra de la Laguna. It seems to be the same as *P. Mexicana* Hemsley, excepting that the flower has one stamen instead of five, and probably it should be considered a variety of that species.

43. TALINUM PATENS Willd. The mark of interrogation should be omitted after this species. It is very common from near the seashore to middle elevations of the mountains.

745. MALVASTRUM SCABRUM Gray. One plant only was found in Cañon San Bernardo.

746. KOSTELETZKYA CORDATA Presl. Agrees well with the description in Reliq. Hænk. The flowers are pale lilac in

color, with yellow centres; the petals reflexed.—Abundant at Santa Anita.

747. ANODA ARIZONICA Gray. Sierra San Lazaro and at Cañon Hondo. Plants much larger than those described by Dr. Gray. Collected first by Lemmon in Arizona.

748. OXALIS LATIFOLIA HBK. Common on the west side of the mountains.

749. ILEX sp.

750. ILEX sp.

751. COLUBRINA ARBOREA. High-branching small tree 6–10 m. high, 10–15 cm. thick, sparingly pubescent on the young parts, becoming glabrous: branches slender, green: leaves alternate 3-nerved, thin, ovate-acuminate, 6–15 cm. long, the nerves ending in a series of arches, running close to and parallel with the margin of the leaf, each arch ending in an impressed gland on the lower surface of the remote rounded teeth; petioles 2–2½ cm. long; stipules slender caducous: flowers greenish in axillary cymes shorter than the petioles: calyx and pedicels sparingly pubescent: petals almost without claws rolled round the filament which exceeds them: ovary not free from the disk: fruit not seen. Mountains of the Cape Region, September–October, 1893.

This may possibly be a form of "*Rhamnus glomeratus*" Benth. Pl. Hartw. 9, which is evidently a Colubrina with hardly more than a generic description.

752. VICIA EXIGUA Nutt. Sierra de la Laguna.

162. PHASEOLUS ACUTIFOLIUS Gray, var. TENUIFOLIUS Gray. *P. montanus* Brandg.

753. RHYNCHOSIA PHASEOLOIDES DC. Sierra de la Laguna.

754. CASSIA BIFLORA L.—Rather common on the western side.

755. CARICA CAUDATA. Stems herbaceous, ½–1 m. long from a tuberous root: leaves thin, triangular to ovate in outline, 3-nerved, entire or 3–5-lobed acute or acuminate, truncate or cuneate at base, 3–12 cm. long on slender petioles often exceeding the blade: ♂ flowers (only one cluster seen): peduncle 11 cm.

long, about 5-flowered; calyx 1½ mm. long, segments lanceolate, acute: tube of the corolla slender, 10 mm. long; lobes oblong obtuse half the length of the tube: stamens 10, the 5 larger 3 mm. long, 2-celled, nearly sessile, the alternates 1-celled, 2 mm. long on filaments little shorter—the connective in both forms brush-hairy at tip: rudiment of ovary 3 mm. long: ♀ flowers not seen: fruit 1-celled, oblong-oval beaked, 5–11 cm. long on slender peduncles half as long, and with five horns 3–5 cm. long projecting backward from the base: seeds 6 mm. long covered by the milky white aril; testa rugose, crustaceous. — The first specimen was collected by Dr. Gustav Eisen. It was afterward found abundantly, in fruit, about the western side of the mountains.

756. ECHINOCYSTIS (ECHINOPEPON) COULTERI (Gray).—Cañon Hondo.

259. GARRYA WRIGHTII Torr. This species is common in the mountains, and reaches a height of 3 m. or more. The leaves are not mucronulate on the margins as are most of the Arizona forms. Specimens from the Santa Rita Mountains have nearly smooth leaf margins, while those from Santa Pedro Martir are exceedingly rough.

757. RANDIA OBCORDATA Wats.—Common at low elevations.

758. CRUSEA PARVIFOLIA Hook. & Arn. Bot. Beech. 430. Agrees very closely with the description and figure, differing only in unessential particulars.—Cañon Hondo on the western side of the mountains.

274. VALERIANA SORBIFOLIA HBK.

759. STEVIA MICRANTHA Lag. In the mountains at various places, not common.

760. EUPATORIUM SAGITTATUM Gray. Common in the vicinity of Pescadero, usually growing in brush fences. Well-known from Guaymas northward to Arizona.

293. ERIGERON SUBDECURRENS Schultz Bip. This is the *Conyza Coulteri* of the previous list.

761. CONYZA SOPHIÆFOLIA, HBK.—El Taste.

762. BACCHARIS SAROTHROIDES Gray.—Near Sierra San Lazaro.

763. GNAPHALIUM PURPUREUM L.—Sierra de la Laguna.

764. GNAPHALIUM GRACILE HBK. Growing on the sandy dry beds of streams.

765. FRANSERIA CAMPHORATA Greene. Abundant in the vicinity of Pescadero. It extends northward to the foothills of San Pedro Martir.

FAXONIA gen. nov. Heads heterogamous, radiate, flowers of the ray ♀, of the disk ☿. Involucre of few, narrow bracts, sub 2-seriate and slightly unequal, some of the outer embracing the ray-flowers. Receptacle convex, paleæ, membranaceous linear. Ligule of the ray-flowers rudimentary. Style glabrous, acuminate. Akenes somewhat curved, without pappus, apparently fertile. Flowers of the disk yellow, with deeply and somewhat irregularly cleft limb. Stamens distinct or two occasionally joined. Anthers short. Style branches linear, stigmatic on the inner surface nearly to the somewhat dilated truncate tip. Akenes with a pappus of irregular slender awns.

Named in honor of Mr. C. E. Faxon, whose exquisite drawings for the Sylva of North America have placed him in the front rank of botanical artists.

766. F. PUSILLA.* Plant (only one seen) 8 cm. high, branching from near the base, villous all over with many-jointed hairs tipped with capitate glands: leaves opposite, lanceolate, unequal-sided, 1–2 cm. long, dentate, the teeth small, obtuse, and remote, the veins marked by oil glands; petiole very slender equaling, or in the upper many times exceeding the blade, dilated and somewhat clasping at base: inflorescence axillary; heads ovate 3–4 mm. high, 10–15 flowered: bracts of the involucre 6–8, nearly equal, lanceolate, with somewhat foliaceous tips, 2–4 of them curved, complicate and embracing the ray-akenes: receptacle not villous, bracts narrowly linear more or less united: ray-flowers with pubescent tube and nearly obsolete ligule; style branches long-acuminate; akenes apparently fertile, glabrous, curved, striate, compressed. 1½ mm. long: disk flowers 2 mm. long,

* PLATE XXXI. 1, whole plant enlarged; 2, head; 3, ray-flower with embracing bract; 4, same with flower drawn out; 5, bract of the receptacle; 6, disk-flower; 7, same opened; 8, stamen.

tube densely glandular-villous, lobes linear, rather longer than the tube, pubescent, marked by oil-tubes, somewhat irregularly cleft and thickened at tip; anthers very short, oval, somewhat unequal at base, usually distinct, but sometimes 2 joined, less than ½ mm. long, including the equally long appendage; style-branches enlarged truncate and villous at tip.

767. DYSODIA ANTHEMIDIFOLIA Benth. The segments of the leaves are very broad and obtuse giving to the plant a very different appearance from the Magdalena Bay specimens.—Along the Coast below Pescadero.

PECTIS BERLANDIERI DC.—El Taste near Sierra San Lazaro. It is the same as Dr. Palmer's No. 61 (1885) from Southwestern Chihuahua, excepting that the leaves are much broader.

349. HIERACIUM ARGUTUM Nutt. (?) A high mountain plant which may possibly prove distinct.

768. ERECHTHITES RUNCINATA DC.—In damp fields at Santa Anita where it was probably introduced.

769. BUMELIA ANGUSTIFOLIA Nutt.—Small bushy trees growing in the vicinity of Pescadero. No mature fruit was found but the flowers, leaves, and habit are of this species.

770. DIOSPYROS TEXANA Scheele. "Guayparin." Probably a form of this species, but as no flowers could be found the determination is uncertain. It is a small tree and not uncommon along the base of the mountains. The leaves are two or three inches long and vary on different trees from glabrous to tomentose; the fruit about an inch in diameter is black when ripe and very pleasant to the taste.

771. FORESTIERA MACROCARPA. A shrub or small tree, 2–6 m. high, glabrous: leaves entire, of thin texture, elliptical or oblong-ovate, cuneate at base, acutish or obtuse, 2–3 cm. long, on peduncles 4–5 mm. long: drupes solitary or few in clusters, oblong, 12–15 mm. long, dark blue; pedicels about as long as petioles; putamen curved, striate.

This species is related to *F. pubescens* and *tomentosa* but differs from both by having thinner, glabrous leaves and larger fruit. The putamen is striate like that of *F. pubescens* and the leaves as entire as those of *F. tomentosa*.—Found in fruit only,

growing along a rocky stream near Sierra San Lazaro in the month of September.

772. SARACHA JALTOMATA Schlecht. (?) From its characters nearest to this species.—Near San Felipe, where it was probably introduced.

773. STEMODIA PUSILLA Benth. Plants less hairy, corolla larger and longer as compared with the calyx, than in Mazatlan specimens.—Cañon de San Bernardo.

774. VERBENA PROSTRATA R. Br. Spikes less dense and plants less hirsute than specimens from California. Seen only in San Bernardo Cañon, where it may have been introduced.

775. VERBENA POLYSTACHYA HBK. Sierra San Francisquito, where it was doubtless introduced.

776. DURANTA PLUMIERI Jacq.—Both flowers examined had five stamens: one all perfect and the other with the fifth somewhat imperfect. Common at middle elevations on the west side of the mountains, sometimes forming impenetrable thickets.

462. CITHAREXYLUM BERLANDIERI Rob. Very nearly the same as Pringle's specimens from San Louis Potosi.—Found only about the cultivated fields of Miraflores where it is not uncommon.

777. HYPTIS SUAVEOLENS Poit.—Growing very abundantly about the ranch at La Mesa, where it was probably introduced.

778. CELTIS PALLIDA Torr.—Common about Pescadero and the western coast.

779. CELTIS RETICULATA Torr.—Small trees growing about Sierra San Lazaro.

517. EUPHORBIA HETEROPHYLLA L. A form of this variable species having the base of the floral leaves red is not uncommon in the mountains.

542. EUPHORBIA INCERTA Brandegee. This species was collected on the sea shore at Mazatlan and as it is apparently a maritime species of considerable range should have been found by other collectors.

780. BERNARDIA (?) FASCICULATA Wats. Proc. Am. Acad. xviii, 153, 1883. It belongs however to the Phyllantheæ.

781. CROTON MAGDALENÆ Millspaugh.—San José del Cabo and in the mountains. Some forms are much less pubescent or hirsute than the type from Magdalena Island.

549. CROTON FRAGILIS HBK. Var.—This is very near the variety *sericeus* of Dr. Palmer's Chihuahua collection. The specimens from different parts of the Cape Region vary from one another very much in their pubescence, those from Sierra San Lazaro being much larger and more glabrous than those from the vicinity of San José del Cabo.

551. BERNADIA MEXICANA Müll. Arg. var. *B. viridis* Millsp. This is also the *B. Brandegei* Proc. Cal. Acad. ser. 2, vol. iii, 172, which is an inadvertence, no species having been described under that name. It is a rather common bush of the Cape Region at middle elevations.

536. ADELIA VIRGATA. A diœcious shrub 2–3 m. high with whitish stems and long almost simple branches studded with stout more or less woolly spurs on which are borne the crowded leaves and flowers: leaves oblanceolate to oblong or obcordate, 1½–3 cm. long, sparingly appressed pubescent, soon glabrate, cuneate at base to a short petiole: flowers 4–6 at the summit of the spurs; pedicels 5–10 mm. long, jointed about the middle: calyx valvate, 5-parted, the segments acute, 2–3 mm. long densely villous without and within: stamens about 15 concreted at base with the rudimentary ovary. Ovary of ♀ flower sessile on the disk, 2–3- ordinarily 2-celled, hirsute; styles united at base, fimbriate-lacerate, stigmatiferous over the whole inner surface: fruit glabrate commonly 2-coccous, about 2 cm. high by 3 cm. in breadth, marked by a cruciform sulcus; seeds orbicular the size of a pea with coriaceous brown, somewhat mottled testa; endosperm thick; cotyledons reniform.—Widely spread over the southern part of the peninsula; now first collected in flower.

782. SALIX TAXIFOLIA HBK.—Growing along streams of the western side, but not abundant. Determined by M. S. Bebb.

783. ARETHUSA ROSEA Benth.—Common on the high mountains.

571. MICROSTYLIS OPHIOGLOSSOIDES Nutt.—High mountains of the Cape Region.

573. HABENARIA CRASSICORNIS Lindl. ex. char—High mountains of Cape Region, October, 1893.

574. HABENARIA THURBERI Gray.—High mountains, October 17, 1893.

784. HABENARIA DIFFUSA R. & G.—El Taste, September 14, 1893.

785. HABENARIA CLYPEATA Lindl.—El Taste, September 14, 1893.

786. HABENARIA LUCÆCAPENSIS Fernald.*—Saltillo, September 16, 1893.

787. TILLANDSIA RECURVATA L.—Growing on bushes and trees, especially on arborescent Cereus, in a gap in the mountains southeast of Todos Santos.

578. SISYRINCHIUM SCHAFFNERI Wats.—The specimens vary considerably in height and breadth of leaves. Some of them agree perfectly with No. 1376 Pringle, from Chihuahua, as nearly as can be made out from comparison with an immature specimen.—Common on the summits of the mountains growing under oaks and pines.

588. TRADESCANTIA CRASSIFOLIA Cav.—This seems distinct from Pringle's No. 1681, but it agrees with the descriptions and Cavanilles' figure quite as well. The plants are smoother and smaller than the Mexican forms and nearest the variety *glabrata*.

590. TINANTIA FUGAX Schiedw. *T. modesta* Brandg. Proc. Calif. Acad. ser. 2, iii, 175. A rather common species, found along the base of the mountains in a branching almost glabrous form, at higher elevations in a more simple and pubescent form, the sepals long-glandular hairy.

788. CYPERUS DIANDRUS Torr.—La Mesa; San Jacinto.

789. OPHIOGLOSSUM CROTALOPHOROIDES Walter.† *O. bulbosum* Michx.—El Taste.

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* See page 379 preceding. The Orchidaceæ of this list were determined by M. L. Fernald of the Gray Herbarium.

† Filices determined by Prof. D. C. Eaton.

790. OPHIOGLOSSUM NUDICAULE L.—El Taste.

791. GYMNOGRAMME PEDATA Kaulfuss.—Near Mt. San Lazaro.

792. PELLÆA SKINNERI Hooker—Near Mt. San Lazaro.

793. ASPLENIUM PUMILUM Swartz.—Near Mt. San Lazaro.

794. WOODWARDIA RADICANS Smith.—La Chuparosa.

795. MARSILIA MINUTA Fournier.—San José del Cabo. Identified by L. F. Underwood.

REVIEWS.

Letters of Asa Gray—Edited by—Jane Loring Gray—in two volumes—1893—Houghton, Mifflin & Co. "It has been my aim, in collecting and arranging the 'Letters' from Dr. Gray's large correspondence, to show as far as possible in his own words, his life and his occupation. The greater part of the immense mass of letters he wrote were necessarily purely scientific, uninteresting except to the person addressed; so that many of those published are merely fragments, and very few are given completely. I have made no attempt to estimate his scientific or critical labors, for they are sufficiently before the world in various printed works; but something of the personality of the man and his many interests may be learned from these familiar letters and from even the slight notes."

From this prefatory note by Mrs. Gray the scope of these letters is at once apparent. They make the reader acquainted with the man, and sufficiently so with the student of plants to make them indispensable to every American botanist. The botanical letters of Gray are still to be hoped for in the future. Nearly every contemporary botanist in America can furnish treasured and most interesting letters from him but it may be that they were intentionally withheld for the present, on account of his well-known habit of expressing his views forcibly and unreservedly concerning all botanical subjects discussed. We reprint, by kind permission of Mrs. Gray, on page 372 preceding, the last letter written by Dr. Gray.

Die Parasitischen Exoasceen. A Monograph. By R. SADEBECK. Hamburg, 1893. In the above monograph is presented a very complete and accurate account of the peculiar group of Fungi, the Exoasceæ. The members of this family are fungi of extremely simple structure, and some of them are parasites that cause serious trouble by their ravages. Probably the most familiar species is *Exoascus deformans* (Berk.) Fuckel, the cause of the well-known disease of peach trees popularly called "leaf-curl." When the trees are severely attacked they sometimes are almost completely stripped of their leaves, resulting in a serious check to the tree's growth.

The first section of Professor Sadebeck's monograph deals with a comparative study of the development and biology of the parasitic Exoasceæ. Although many experiments were made with various species, none of the attempts to grow the spores upon artificial culture media were entirely successful, and in no cases was he able to produce spore-bearing plants in this way. In some instances, however, he was able to follow the penetration of the host by the germ-hypha of the parasite, and to trace its development within the host. The species especially studied were *Exoascus Tosquinetii* (West) Sadeb., *E. epiphyllus* Sadeb., *Taphrina Sadebeckii* Johans., as well as several other species of *Taphrina*. In the species of *Exoascus* the mycelium is perennial, and this insures the perpetuation of the fungus, even if for any reason the spores should fail to germinate.

The asci open by a cleft at the apex, and the spores are violently ejected by the strong contraction of the side walls of the ascus which are in a state of tension before it opens. Sometimes instead of the ordinary spores, yeast-like conidia are produced within the ascus, and in case the conditions are unfavorable for the formation of either spores or conidia, e. g. in very rainy weather, the asci form directly yeast-like conidia by budding.

Sadebeck separates the parasitic Exoasceæ into the genera *Exoascus* Fuckel, *Taphrina* Fries, and *Magnusiella* Sadeb. The first genus is characterized by the perennial mycelium and the fact that the whole mycelium, or at least that part under the cuticle of the infected leaf, breaks up into cells that develop directly into asci. Twenty-one species are given.

Taphrina has no perennial mycelium, and therefore is entirely dependent upon spores for its propagation. The mycelium shows a differentiation into a sterile and fertile portion, the former alone giving rise to the asci. Fourteen species are included in the genus.

Magnusiella is a new genus that differs from both of the others in its more deep-seated mycelium and the formation of asci between the epidermal cells, and not below the cuticle. Five species are enumerated.

Two non-parasitic genera, *Endomyces* Tulasne, and *Ascocorticium* Brefeld, are also included in the Exoasceæ.

The remainder of the paper is mainly taken up with a critical discussion of the parasitic genera, with descriptions of all the described species, including their geographical distribution.

The paper is well illustrated by three excellent double lithographic plates. DOUGLAS H. CAMPBELL.

Maize: A Botanical and Economic Study. (Contributions from the Botanical Laboratory of the University of Pennsylvania, Vol. i. No. 2.) By JOHN W. HARSHBERGER. This is a paper of much interest, on the structure origin, and economic importance of Indian corn.

Minnesota Botanical Studies; Bull. 9. pt. i.: I, Prefatory Note; II, The occurrence of sphagnum atolls in Central Minnesota, CONWAY MACMILLAN; III, Some extensions of plant ranges E. P. SHELDON; IV, On the nomenclature of some species of Astragalus, E. P. SHELDON; V, List of fresh water Algæ collected in Minnesota during 1893, JOSEPHINE E. TILDEN; VI, On the poisonous influence of *Cypripedium spectabile* and *Cypripedium pubescens*, D. T. MACDOUGAL.—Prof. MacMillan's paper is an attempt to account for the formation of Sphagnum atolls in lakes, with some account of the plants found on them. In No. 3 Mr. Sheldon gives a list of a number of plants either reported for the first time or rare in Minnesota, describing two new species, *Polygonum rigidulum* and *Aster longulus; Claytonia latifolia* an older varietal name is substituted for *C. Caroliniana;*

Potentilla supina var. *Nicolletii* is raised, and *Viola canina* var. *longipes* restored, to specific rank. In No. 4, the author shows that the Kew Index is not an unmixed blessing, by changing the names of a couple of dozen Astragali. Of these changes twenty-two are marked n. n., and two n. sp.; *A. scobinatulus* Sheldon taking the place of *A. Haydenianus* var. *major* which was changed because of *Astragalus glabriusculus* var. *major*, and *Astragalus elatiocarpus* Sheld. being substituted for *Astragalus lotiflorus* forma *brachypus*. *A. ceramicus* Sheld. is substituted for *A. pictus; A. ceramicus* var. *Jonesii* Sheld. for *A. pictus* var. *angustatus; A. ceramicus* var. *imperfectus* Sheld. for *A. pictus* var. *filifolius; A. accumbens* Sheld. for *A. procumbens* Wats.; *A. oblatus* Sheld. for *A. nudus* Wats.; *A. vexilliflexus* Sheld. for *A. pauciflorus* Hook.; *A. gilviflorus* Sheld. for *A. triphyllus* Pursh.; *A. gambellianus* Sheld. for *Astragalus nigrescens* Nutt. (crediting Prof. Greene by the way for "pointing out the difference between this species and *A. didymocarpus*"); *A. apilosus* Sheld. for *A. glaber* Michx.; *A. spatulatus* Sheld. for *A. cæspitosus* Gray; *A. syrticolus* Sheld. for *A. Thompsonæ* Wats. (changed on account of *A. Thomsonianus* Benth.); *A. Jepsoni* Sheld. for *A. demissus* Greene; *A. suturalis* Sheld. for *A. eriocarpus* Wats.; *A. intonsus* Sheld. for *A. villosus* Michx.; *A. umbraticus* Sheld. for *A. sylvaticus* Wats.; *A. famelicus* Sheld. for *A. fallax* Wats.; *A. asymmetricus* Sheld. for *A. lencophyllus* T. & G.; *A. Watsoni* Sheld. for *A. Hendersoni* Wats.; *A. prælongus* Sheld. for *A. procerus* Gray; *A. strigosus* (Kellogg) Sheld. (*A. hypoglottis* L. *var. strigosa Kell.*) for *A. tener* Gray, and in consequence of this change, *A. griseopubescens* Sheld. for *A. strigosus* Coult. & Fish.; *A. coccineus* (Parry) Brandegee, a synonym of *A. grandiflorus* Wats. is kept up on account of *A. grandiflorus* Pall. a synonym of *Oxytropis grandiflora*. Nearly all these names are changed on account of the "once a synonym always a synonym" rule, which is made to apply to synonyms of other genera and to varieties, not only as against younger species, but as against varieties of other species. Left to legitimate revisions it is not probable that a half dozen of these names would ever have to be changed, and in view of the vagueness of varieties in botany, and the fact that varietal names

are seldom catalogued a perfectly appalling vista of changes and uncertainty is opened to the view. It is matter of minor importance, but still to be regretted that Mr. Sheldon should have been so singularly unfortunate in the selection of some of his names.

The fifth paper is a list without notes, excepting of station, of fresh water Algæ. The sixth discusses the alleged poisonous properties of certain Cypripediums, the author concluding from his own experience that *C. spectabile* is in his case at least, a strong local irritant.

Botany of the Death Valley Expedition By F. V. COVILLE (Contr. U. S. Nat. Mus. vol. iv). This is one of the most important, as well as the most voluminous contributions to the botany of the Southwest. The chapters on "Characteristics and Adaptations of the Desert Flora" are most interesting, so also are those on distribution in which however must be taken into account the necessarily far from exact information acquired by a single expedition, which will be sufficient reason for differences of opinion not only as to many of the details of distribution, but as to the value of some of the zonal plants selected. The sixty-six pages devoted to a list of the species by numbers and to a bibliography might have been omitted as the information contained was nearly all embodied in the main list occupying the previous pages. The whole number of species and varieties enumerated including algæ and fungi is 1261 a considerable proportion of them belonging to the "Greeneian" category, and as the author remarks "It should be understood that the desert region of California of which Death Valley forms a part, does not contain all these twelve hundred species. More than one-half of them were collected either in the Sierra Nevada and its southern continuations, or in the Tulare Plains, areas with vegetation almost wholly different from that of the desert region." The paper would indeed have been of quite as much value if the long catalogue of familiar plants found along the route especially in the valley of the San Joaquin had formed no part. It adds very little more to our knowledge than would a similar list of the plants collected in an expedition from Boston to New York.

With the nomenclature of the author, as is perhaps well-known we do not agree, and especially we object to the setting aside of specific for older varietal names, as these last are seldom catalogued in works of reference the element of confusion introduced will be of very remote settlement.

We may safely rely upon Mr. Coville's future knowledge of Western plants, to convince him of the inherent weakness of the generic propositions of "Oreobroma," "Uropappus," "Ptilocalais," "Linanthus," "Allocarya," "Sonnea," "Oreocarya," "Eremocarya," "Piptocalyx," etc.

The metric system is adopted throughout the work as is now the custom in most scientific papers. — brought face to face with the kilometre we are however reminded with more than usual force of the great fault of the system—the inexcusably long terms. The author says: "To those not familiar with this system, the following table * * * will be useful." We commend this table to the printers and proofreaders of the Department especially in connection with *Erigeron calvus* described both in Proc. of Biol. Soc. and in this work as "1 cm. high * * * blades [of the leaf] 1–1.5 cm. long, tapering into a petiole of twice that length * * * heads 7 to 8 mm. high." "*Potentilla purpurascens pinctorum* * * stems about 3 cm. high, radical leaves 7 to 14 cm. long." or *Phacelia hispida brachyantha* * * * 1 to 3 cm. high * * * calyx 5 mm. long * * * in fruit reaching 10 mm. long."

The whole number of species and varieties described as new is 42. The author has described them with conscientious care and tolerable fullness. The greater number are valid as far as we can be certain from the text and the plates in which 21 of the species are figured. Very few of the types have been seen by us, but Mr. Coville promises a very welcome set to the Herbarium of the California Academy of Sciences, where it will be accessible to all botanists of the West.

Aquilegia pubescens seems too closely related to *A. chrysantha*.

Agreeing with Trelease Mr. Coville considers *T. platyarpum* as not more than a variety of *Fendleri*, he quotes in the synonymy Pitt. i, 166, but appears not to have noticed Mr.

Greene's remarks in Pitt. ii, 24 where he renames it *T. hesperium* under which name it occurs in his local floras.

Brasenia purpurea Michx. under *Hydropeltis*, 1803, is taken up in the place of *Brasenia peltata* Pursh, 1814: Brasenia was characterized by Schreber in Gen. Pl. ed. viii, 1789, and to the single species the name *Schreberi* was applied by Gmelin in Systema Naturæ, ed. iii, 853, 1791.

Argemone platyceras collected on the desert is of course the form of that species collected by the writer at one of the railway stations between Amboy and the Needles, and described by Mr. Greene as *A. corymbosa*.

Cleomella brevipes grows abundantly about Newberry Station, where it was collected in 1884.

Isomeris arborea globosa Cov. is in the herbarium of the California Academy of Sciences in every gradation between it and the typical form. Specimens collected by the writer between Caliente and Keene Station with very large globose pods have no groove in the seed. Specimens with long narrow pods from Calamajuet, Lower California have a deep groove. The same form from San Diego has no groove. All the forms grow together on the slopes of Tehachapi.

Malvæopsis is accepted by the author as the older name of Malvastrum. Mr. E. G. Baker, however, in the course of his enumeration of the Malvaceæ, says that the type of Malvæopsis was a Sphæralcea, wrongly identified by Otto Kuntze as a species of Malvastrum.

Fremontia is changed to "*Fremontodendron*" on account of the previous *Fremontia* a synonym of Sarcobatus.

Purshia glandulosa is kept up under *Kunzia*. In the opinion of the writer it is a not very distinct variety.

Mentzelia reflexa Coville was collected by the writer in the vicinity of Bagdad, on the Mojave Desert, in 1884.

Aplopappus interior Coville is evidently the form of *A. linearifolius* which prevails at a distance from the Coast. A good series of the forms approaching it would probably have modified the author's views.

Aster mohavensis Coville, "It cannot, however, retain its origiual specific name, since Michaux described an *Aster tortifolius* which is now referred to *Sericocarpus tortifolius*."

Lessingia "*tennis*" Cov. *L. ramulosa* var. *tenuis* Gray, of Bot. Cal. 1. 307, and Syn. Fl. ii, 1, 162 "as to the pl. of Rothrock in Wheeler Rep. vi, 364. There is however an older var. *tenuis*, described in Proc. Am. Acad. vii, 351, belonging to *L. leptoclada* which in Syn. Fl. Supp. 447 is reduced with *L. nemaclada* Greene to *L. leptoclada* var. *microcephala* Gray. The printer has further complicated the matter by misprinting Mr. Coville's specific name, and altogether botanists adopting the Sheldonian method will have a good subject.

The specific name of *Pluchea borealis* is changed to *sericea* "(Nutt.) under *Polypappus*." The species was first published in Emory's Rep. 1848, p. 147 as "TESSARIA BOREALIS DC. An aromatic shrub about three feet high growing in all the deserted beds of the Gila, and in the Valley of the Del Norte usually with the Frémontia both of which are abundant in those regions." If this had been a plant of Rafinesque's it would have probably been considered quite well authenticated. It is certainly quite as recognizable, being placed in its proper genus, and with a definite locality, as Nuttall's later genus, sandwiched in between Micropus and Psathyrotes, and entirely without generic description, though named as a new genus, described from a single "imperfect specimen, apparently male," and with the station "Rocky Mountains of Upper California."

Helianthus invenustus Greene, was collected by Mr. Brandegee at Sequoia Mills 1892, and its peculiarities noted in Zoe, July 1893, p. 153.

Layia is maintained instead of the recently resurrected Blepharipappus under which Prof. Greene has renamed the species.

Chænactis attenuata can not be kept distinct from *C. carphoclinia*, every gradation is found between them.

Lepidospartum striatum Cov. is *L. latisquamum* Wats. Proc. Am. Acad. xxv. 133.—both described from the same plants collected by Shockley.

Adelia is taken up as an older name for *Forestiera*.

Menodora spinescens is in Shockley's collections from Candelaria.

Such species as *Navarretia setiloba* are evidence that the National Herbarium is in need of such a set of the variations

belonging to that section, as is possessed by the California Academy of Sciences.

Phlox austromontana Coville—"The No. 1839 Parish." which he includes in the type bears on the label "*Phlox speciosa* Pursh, var. *congesta* Gray (var. nov.), June, 1886.

In his remarks on *Macrocalyx micranthus*, Mr. Coville has evidently overlooked the notice in "Plants from Baja California," Proc. Cal. Acad. ser. 2, ii, 186.

Conanthus aretioides is reduced to Nama as *Marilaunidium aretioides*. If in obedience to Kuntze, Nama is applied to a different genus, one would think that Conanthus being reduced, it and not Marilaunidium should be the accepted name for Nama.

Mohavea breviflora can hardly be specifically distinct. Specimens of *M. viscida* with leaves as broad and nearly as short were sent by the writer to Gray in 1884.—They were collected at Amboy Station on the Mojave Desert. Mr. Brandegee collected the form described by Mr. Coville, at Keeler, in April, 1891—some of the corollas were conspicuously dotted while in others growing beside them the purple dots were nearly or quite wanting.

Sarcobatus Baileyi Coville, is founded on dwarfed and perhaps diseased specimens, for the large fruiting bracts contain not even the rudiment of an ovary. Our specimens of *S. vermicularis* do not sustain the remarks of the author, for the female flowers are as Bentham & Hooker say, axillary and solitary on leafy shoots of all lengths from 5 mm. to 1 dm. long—of course the longer the fruiting branch is the more flowers will be found upon it. There is certainly no such thing in any of our specimens as a "floral axis" of the female flowers, the fruiting branches are normally terminated by the male spike but it is often wanting, and the bushes seem even to be occasionally diœcious. If this stunted pubescent form deserved specific rank it would have *Sarcobatus Maximiliani* Nees, figured in Bot. Zeitung, vol. ii, 753, t. vii.

The new genus Phyllogonum can hardly be considered sufficiently distant from Nuttall's Stenogonum, in which though the single species is now referred to Eriogonum, the involucre is a very variable quantity, Nuttall said it had none. The embryo of Phyllogonum is described as "nearly straight, radicle lying along one angle of the seed; cotyledons orbicular, lying at the

base of the seed, bent at an angle of about 45° from the radicle." The artist has not been very successful in depicting a triangular ovary and akene.

Bloomeria aurea Kell, has its name changed to *B. crocea* on account of the *Allium croceum* Torr. Boh. Mex. Bound 218 (1859). But *Bloomeria aurea* was published in "The Hesperian" with a colored plate, December, 1859, and the month of the Boundary publication ought to be convincingly set forth before a name already well established in floriculture is disturbed.

Ephedra viridis named from imperfect material, occurs scattered through the range of *E. Nevadensis*, of which it is probably only a form. It is very bad practice, especially on the western side of the continent, to give currency to species no better characterized than this and *Potentilla eremica*. K. B.

The Genus Phyllospadix, by WILLIAM RUSSEL DUDLEY. Reprinted from the Wilder Quarter-Century Book. An interesting account of the genesis and structure of Phyllospadix. The author is evidently of opinion that the differences between the two forms are so slight as hardly to warrant their continued separation. The author has had better facilities than any previous student of the genus and the two excellent plates give one for the first time an adequate idea of the structural details of the plant.

Manual of the Bay Region Botany, A Systematic Arrangement of the Higher Plants Growing Spontaneously in the Counties of Marin, Sonoma, Napa, Solano, Contra Costa, Alameda, Santa Clara, San Mateo, and San Francisco. By EDWARD LEE GREENE. The title should have been *A Phanerogamic Flora of—— counties in the State of California, omitting Typhaceæ, Lemnaceæ, Naiadaceæ, Alismaceæ, Juncaceæ Cyperaceæ Gramineæ, Coniferæ and numerous species in the other orders; with thirty "new species" none of which are new, and nearly all vaguely characterized both as to character and station; and with every change of name which the author's present knowledge admits.* The work is a second and much restricted edition of the unfinished "Flora Franciscana," which under its misleading name included the

plants from Mt. Shasta to Tehachapi and the whole breadth of the State. The useful part of "Flora Franciscana"—the dates, citations and synonymy have been carefully omitted. The orders as presented by Mr. Greene furnish us some unfamiliar names such as Amarantoideæ, Tithymaloideæ, Sarmentosæ. From Rosaceæ he separates Pomaceæ and Drupaceæ; Cichoriaceæ from Compositæ considering it much nearer Lobeliaceæ; and Cuscuteæ from Convolvulaceæ. In the matter of genera he has cut himself loose from all trammels crediting Dioscorides with 38 genera, Theophrastus with 14, Pliny with 32, Vergil, Varro, Dillenius and Micheli, each with 4, Brunfels with 12, Vaillant with 7, Dodoens with 8, Columna with 6, Lobel with 5, Galen, Tragus, Nicander, Gesner and Dalechamps each with 3, and 1 or 2 each to Catullus, Valerius Cordus, Cortusi, Ruppius, Chabræus, Mutis, Ruellius, Clusius, Camerarius, Matthiolus, Cæsalpinus, Tabernaemontanus, etc., etc. The kaleidoscopic changes of generic names must keep his unfortunate pupils on the rack. *Clematis* again takes the place from which he ousted it in Fl. Fr. for *Clematitis*. The yellow-flowered watercress is to be called *Rorippa;* while the white-flowered species are retained under the old name. *Franca* takes the place of *Frankenia; Vibo* is substituted for *Emex; Hippocastanum* for *Æsculus; Siliquastrum* for *Cercis; Oxys* for *Oxalis; Butneria* for *Calycanthus; Pseudacacia* for *Robinia; Medica* for *Medicago; Opulaster* for *Neillia; Therofon* for *Boykinia; Limnopeuce* for *Hippuris; Sphondylium* for *Heracleum; Distegia* for *Lonicera involucrata; Ecliptica* for *Eclipta; Gnaphalodes* for *Micropus; Heleniastrum* for *Helenium; Centrophyllum for Carthamus; Triodanis* for *Specularia; Brossæa* for *Gaultheria; Meadia* for *Dodecatheon; Alsinanthemum* for *Trientalis; Pervinca* for *Vinca; Plantaginella* for *Limosella; Bellardia* for *Bartsia; Gale* for *Myrica; Limodorum* for *Epipactis; Orchiastrum* for *Spiranthes; Bermudiana* for *Sisyrinchium; Vagnera* for *Smilacina; Unifolium* for *Maianthemum; Disporum* for *Prosartes;* etc., etc.

Prof. Greene apparently in the full belief that only his book will be used hereafter, sedulously refrains from mentioning the well-known equivalents of his adopted genera and we give them for the benefit of any student who may chance to lack a large

library, and be puzzled by the names of that obscure treatise commonly called "The Botany of California."

The species are of course split to the utmost, the most trivial attribute furnishing sufficient cause for resurrecting an old synonym or making a new species. The descriptions, when not compiled, with the more important characters omitted, are descriptions of specimens instead of species; in a very large number of cases so defined—or undefined—that no distinction is shown—the organs mentioned in one diagnosis being omitted from others; often absurd misstatements are made, for example, the "rich brownish red" *Nuphar polysepalum;* the "capsular, circumscissile" fruit of Garrya; or *Campanula exigua*, found "only the very summits of the highest mountains, Diablo, Tamalpais, and Hamilton" when in fact it is most abundant at moderate or low elevations, such as the upper end of Mill Valley, perhaps 500 feet; Bolinas Ridge, 1600; and St. Helena just above the toll house — which is only 2300 feet above sea level.

The principle upon which genera are united or divided is past finding out. Bigelovia for instance of which only two species occur in his limits, has them divided between Ericameria and Isocoma; Lonicera separates into Caprifolium and Distegia; Hemizonia into Calycadenia, Blepharizonia and "Centromadia" a new genus for the *pungens* group; etc.; while he coolly unites Spirostachys a genus with flowers borne in the axils of persistent scales, and albuminous seeds with a dorsal nearly straight embryo, into Salicornia a genus bearing its flowers in excavations of the joints, seeds without albumen and with conduplicate embryo; and Eremocarpus with imbricate sepals and 1-locular ovary into Croton which has usually valvate sepals and 3-locular ovary, passing over Crotonopsis with nearly the characters of Eremocarpus.

Attention has been called in a previous paper* to Prof. Greene's scanty knowledge of the flora of even his immediate vicinity. In the preface to his book he asks those who may make use of it to furnish a record of additions within its limits. We subjoin a few, which readily occur to us:—*Brasenia peltata*, Bouldin Island; *Wislizenia refracta*, Lathrop to Stockton; *Polygonum Parryi*,

* Zoe IV. 68.

Howell Mountain; *Eriogonum fasciculatum*, San Francisco; *Chorizanthe polygonoides*, Tamalpais and Oakland Hills; *Chorizanthe uniaristata* near Livermore; *Lastarriæa Chilensis*, common between Antioch and Mt. Diablo; *Claytonia diffusa*, Mill Valley, Tamalpais; *Elatine Californica*, Suisun and Antioch; *Caulanthus crassicaulis*, near Altamont; *Fremontia Californica* near Wright's in the Santa Cruz Mountains; *Ceanothus rigidus*, Tamalpais; *Rubus leucodermis*, Sonoma County; *Glinus Cambesidesii*, San Joaquin Bridge; *Cypselea humifusa*, same locality; *Callitriche sepulta*, San Francisco; *Œnothera Californica*, near Antioch; *Œnothera gauraeflora*, near Livermore; *Circæa Pacifica*, specimens in Herb. Cal. Acad. marked "Tamalpais" Kellogg; *Crantzia lineata*, Antioch and Martinez; *Ledum glandulosum*, Point Reyes; *Pleuricospora fimbriolata*, near Healdsburg; *Hydrophyllum occidentale*, slopes of Mt. Diablo above Clayton; *Mimulus Congdoni*, near Lagunitas in Marin County; *Mimulus Rattani*, summit of Tamalpais; *Linaria vulgaris* near Valley Ford in Marin County; *Utricularia vulgaris*, near Olema, Bouldin Island, and about the railway trestles of the San Joaquin; *Boschniakia strobilacea*, Tamalpais and Mt. St. Helena; *Lycopus sinuatus*, *Scutellaria galericulata* and *S. lateriflora*, Bouldin Island; *Anemopsis Californica*, Alameda marshes, Collinsville, etc.; *Odontostomum Hartwegi*, near Napa.

There is let us hope no botanist prepared to follow Prof. Greene in his wild hunt through the lexicons, for names, many of which if they could possibly be identified with certainty, would still be only manuscript names. Any date earlier than that of Linnæus involves a prodigious waste of time and long uncertainty, and with the evidence of his writings before us we submit that Prof. Greene's time could be much more usefully spent in taking an elementary course in botany at Harvard or Stanford.

A year or two before his death Dr. Gray dubbed the author "The new Rafinesque." In this he was unjust to Rafinesque who was at once a great egotist, a little mad, and somewhat of a genius. Prof. Greene lacks the genius. K. B.

NOTES AND NEWS.

Prof. C. Sargent of Harvard, accompanied by Mr. W. M. Canby, are on this Coast, looking at trees for the benefit of the "Silva of North America." They have visited San Diego, San Francisco, Berkeley, Palo Alto, Monterey, etc., and go from here to Santa Barbara, San Bernardino, etc., returning to the East by way of Arizona, where they will make investigations.

JACKSONIA, R. Br. "I am sorry to find that I was in error in supposing (p. 348) that no new name had been substituted for *Jacksonia* R. Br. Prof. E. L. Greene has replaced it by *Piptomeris*, a name under which Turczaninow described a single species referred by Bentham to *Jacksonia:* and proceeds to enumerate thirty-five species under this title. With the aid of the printer he contrives to invent two fresh names: P. 'dilalata' for J. dilatata Benth.; and P. 'purpuascens' for J. purpurascens Muell. It is to be regretted that some more useful or at least less mischievous outlet cannot be found for the superabundant energy of which Prof. Greene seems to be possessed."—JAMES BRITTEN in *Jour. Bot.* xxxi, 274, (December, 1893).

Mr. and Mrs. T. S. Brandegee have taken up permanent residence in San Diego, Calif.: partly for the more agreeable climate and partly to be nearer the chosen field of Mr. Brandegee's botanical labors. They take with them their excellent botanical library, and private herbarium.

Prof. Douglas H. Campbell goes to Europe at the end of the term to spend six months in botanical researches.

With this number completing the fourth volume, the publication of Zoe will cease for the present. For a journal of its age and character it has received good support, and closes with a steadily increasing subscription. It has been, however, too serious a drain upon the time of the editor, and interferes materially with work of more present importance.

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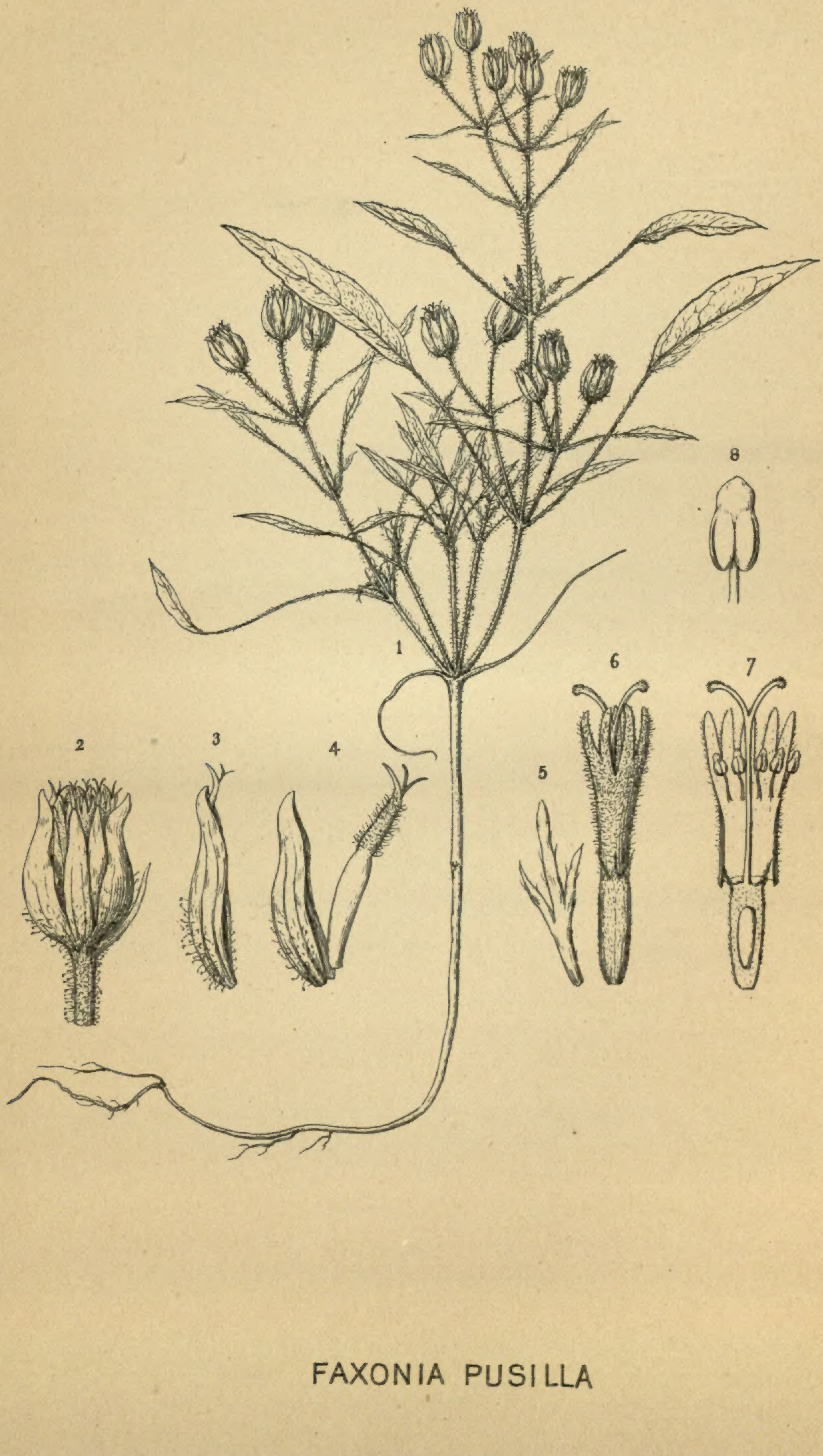
PLATE XXX.

EASTWOODIA ELEGANS



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